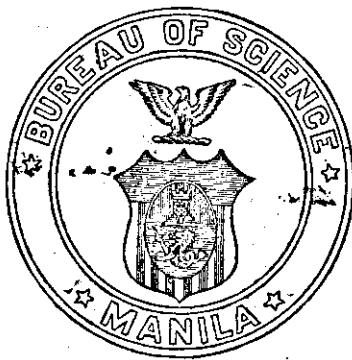


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THE PHILIPPINE JOURNAL OF SCIENCE

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MAY, 1925

No. 1

A NOTE ON THE VIABILITY OF BACILLUS DYSENTERIÆ¹

By HIROSHI KUSAMA

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The present study was initiated for two reasons: First, to obtain information as to the viability of *Bacillus dysenteriæ* outside the human body; second, to search for a medium by means of which the stools of dysentery patients or carriers could be preserved and the detection of bacillary dysentery be made easier. Kolle and Hetsch² state that the resistance of *B. dysenteriæ* outside the body is not very great. Dried on various objects, the dysentery bacilli do not survive longer than eight to ten days; in a wet medium they remain viable for several months. Direct sunshine kills them in thirty minutes. The nontoxic strains, being more resistant than the toxic strains, are viable for several months in culture media. Winter³ found *B. dysenteriæ* Y, dried on cloth, viable for one hundred fifty days. In symbiosis with *B. dysenteriæ* Shiga the nontoxic types outlive the Shiga type.

The study of the viability of the intestinal pathogenic bacteria supplies information necessary to the epidemiologist for the study of outbreaks under local conditions; it may help to explain certain regularity or periodicity of outbreaks and enable the sanitarian to take rational measures to prevent an outbreak from spreading beyond his control.

¹ The experiments were conducted in the Serum Laboratory, Bureau of Science, Manila, P. I.

² Die Experimentelle Bakteriologie und die Infektions-Krankheiten, Urban & Schwarzenberg, Berlin and Vienna, 6th ed. 1 (1922) 376.

As far as the bacteriologic diagnosis of bacillary dysentery is concerned we find in Teague's methylene blue-eosin lactose agar a differential medium of great help, but we lack an enrichment process which would enable us to detect with comparative ease small numbers of *B. dysenteriae*. We find, therefore, that in a fresh stool of an early case there is little difficulty in isolating the microbe, whereas stools that are examined some time after they have been passed or stools from convalescents rarely give satisfactory results. This is due not only to the great bacteriophage susceptibility of *B. dysenteriae*, but also, frequently, to the effect of symbiosis with other intestinal bacteria, particularly *B. coli*.

Owing to the great variety of the representatives of the *B. dysenteriae* group and to the constant association in stools of *B. dysenteriae* with *B. coli* (which apparently is more resistant to all adverse conditions than *B. dysenteriae*), the realization of our hope of possessing as simple and reliable a bacteriologic diagnostic method for the detection of bacillary dysentery as that for the detection of cholera is very remote and the search for dysentery carriers, both convalescent and contact, is still fraught with the greatest difficulties.

EXPERIMENTS ON THE VIABILITY OF BACILLUS DYSENTERIÆ

The arrangement of the viability experiments of *B. dysenteriae* was as follows:

Viability of culture:

- In water.
- In salt solution.
- In bile.
- In glycerine solution.
- In acid and alkaline bouillon.
- Resistance to drying.

Viability of *B. dysenteriae* in stool:

- Normal artificial stool.
- Sterilized artificial stool.
- Resistance to drying in stool.
- Natural dysenteric stool.

CULTURE

In water.—The culture used in these experiments was one that had been isolated recently from a case of acute bacillary dysentery and corresponded to the Shiga type. Two large sterile test tubes, one containing 10 cubic centimeters of sterile distilled water and the other 10 cubic centimeters of sterile tap water, were inoculated with one loopful of twenty-four-hour-old agar.

culture of the above-mentioned strain. The contents were then well stirred, and transplants from the tubes onto acid agar slants were made immediately and every third day thereafter. The tubes containing *B. dysenteriae* suspended in water were allowed to stand at room temperature, protected from direct sunshine. The results of this experiment are shown in Table 1.

In salt solution.—The culture used in this experiment was the same as the one used in the previous one. In a series of test tubes decreasing dilutions of concentrated sodium chloride solution were placed. The total volume of each tube was 1 cubic centimeter. One loopful of a twenty-four-hour-old agar culture was emulsified in each of the tubes, stirred well, and allowed to stand at room temperature, protected from direct sunshine. Subcultures were made immediately and every three to four days thereafter. The results of this experiment are presented in Table 1.

In bile.—The same culture and arrangement were used as in the previous experiments except that bile was used instead of the salt solution. Due to evaporation the bile solution dried completely in seventy-seven days and *B. dysenteriae* could not be isolated after that date. (See Table 1.)

In glycerine.—The same technic and culture were used in this experiment as in the previous one. The details and results are shown in Table 1.

In acid and alkaline bouillon.—Two tubes containing 10 cubic centimeters of acid bouillon +1, two tubes containing 10 cubic centimeters of +0.3 bouillon, and two tubes containing neutral bouillon were inoculated with the above-mentioned culture of *B. dysenteriae* (Shiga type) and allowed to stand in the incubator at 37° C. Transplants were made immediately and at definite intervals. Similarly, a series of alkaline bouillon was planted. One tube of +0.3 bouillon, one tube of neutral bouillon, and one tube of -0.3 bouillon were planted with *B. dysenteriae* (Flexner type) and included in this experiment. The details and results are to be seen in Table 1.

Resistance to drying.—Strips of filter paper (3 centimeters by 1 centimeter) were placed in sterile Petri dishes, soaked well with an emulsion of *B. dysenteriae* (Shiga type), and dried in vacuo at room temperature over calcium chloride. As soon as the paper strips were dried, and every third day thereafter, a small square of the paper was cut off by means of sterile scissors and forceps and placed in a tube containing meat broth and incubated twenty-four to forty-eight hours. The growth that

took place in the tube was identified by the addition of 0.1 cubic centimeter of antidysonteric serum. For the results, see Table 1.

As far as viability of *B. dysenteriae* in pure cultures is concerned, we find that—

1. *Bacillus dysenteriae* survives longer in tap water than in distilled water, but neither in distilled water nor in tap water does it survive as long as *B. coli*.

2. Glycerine has a pronounced antiseptic effect on *B. dysenteriae* and *B. coli* in high concentration. In higher dilutions glycerine is about equally effective a preservative for *B. coli* as for *B. dysenteriae*.

3. Bile proved to be an excellent preservative for *B. dysenteriae* and *B. coli* and very useful in preservation of stock cultures of *B. dysenteriae*.

4. Dried in vacuo, *B. coli* proved to be more resistant than *B. dysenteriae*.

5. *Bacillus coli* proved to be more resistant to alkaline reaction than *B. dysenteriae*, which survived a considerable time in acid bouillon but died quickly in alkaline medium.

VIABILITY OF BACILLUS DYSENTERIAE IN STOOL

Normal artificial stool.—About 2 grams of fresh normal faeces were emulsified in 10 cubic centimeters of normal salt solution, stirred well, and filtered through cotton to remove the large particles. One loopful of a twenty-four-hour-old agar culture of *B. dysenteriae* was emulsified in this suspension. Transplants were made at intervals; the details and results are evident from Table 2.

Sterilized artificial stool.—A stool emulsion was prepared in the same way as described in the preceding experiment, with the exception that the stool emulsion was heated for thirty minutes at 100° C. and then cooled and inoculated. The results can be seen from Table 2.

Resistance to drying in stool.—Fresh normal and fresh sterilized stool emulsions were prepared in the same manner as described above. *Bacillus dysenteriae* (Shiga) and *B. coli* emulsions were prepared also, in the same way as mentioned above. Mixtures of bacterial emulsions and of stool emulsions were made and strips of filter paper were impregnated with these mixtures. The saturated strips of paper were then dried rapidly in vacuum over calcium chloride. Immediately, and every two days thereafter, small pieces of the impregnated and dried papers were placed in tubes of bouillon and incubated at 37° C.

At the end of twenty-four hours incubation Teague's methylene blue-eosin plate was inoculated from each of the bouillon cultures. Suspicious colonies were fished out, transplanted, and identified by means of serum and sugar reactions. Further details and the results are evident from Table 2.

Natural dysenteric stool.—A series of stools from early suspected cases of dysentery was used in the following experiments. The stools were received partly in the natural state and partly diluted with alkaline peptone water because examination for cholera was also requested. This fact accounts for the alkaline reactions registered in the brief protocols given below of stools 2, 8, and 9.

Stool No. 2.—Liquid stool containing mucus and blood. Reaction, alkaline to litmus. *Bacillus dysenteriae* (Flexner type) was isolated from this stool. Suspension of this stool was made and the viability of *B. dysenteriae* studied in the following media: Physiologic salt solution, distilled water, tap water, +1 per cent bouillon, -1 per cent bouillon, and 50 per cent bile salt solution. About 2 grams of the stool sample were emulsified in 10 cubic centimeters of each medium mentioned. The stool sample as received was included for control. Furthermore, part of the stool suspension in distilled water was dried on filter paper in vacuo over calcium chloride. Immediately, and on alternate days thereafter, a loopful of the various emulsions was streaked on Teague's medium and a small strip of the dried stool on filter paper was planted in bouillon and plated on Teague's medium. Further identification of *B. dysenteriae* was carried out in the same manner as described above. The details and results are evident from Table 3.

Stool No. 8.—Liquid stool containing mucus and blood. Reaction, acid to litmus. Specimen more than twenty-four hours old when received. *Bacillus dysenteriae* (Shiga type) was isolated from this stool.

Stool No. 9.—Liquid stool containing mucus. Reaction, acid to litmus. *Bacillus dysenteriae* (Shiga type) was isolated from this specimen. (See Table 3.)

From the experiments on the viability of *B. dysenteriae* in artificial and natural dysenteric stools the following conclusions can be drawn:

1. Unlike the vibrio of cholera, *B. dysenteriae* is fairly resistant to drying. It will survive longer in a sterile than in a normal fresh stool.

2. *Bacillus dysenteriae* will survive a considerable length of time in water. In salt solution, and consequently in sea water, it will survive longer than in tap or distilled water.

3. Physiological salt solution and bile are favorable media for the survival of *B. dysenteriae* in the stool and the combination of the two may help to preserve *B. dysenteriae* in the stools of dysentery patients and carriers, in at least a certain percentage of cases.

Thanks are due to Dr. Otto Schöbl, Bureau of Science, for assistance in the preparation of this paper.

TABLE 1.—*Results of viability tests of Bacillus dysenteriae and B. coli, separately, in various media.*

Medium.	<i>B. dysenteriae</i> survived—	<i>B. coli</i> survived—
	Days.	Days.
Distilled water.....	18	69
Tap water.....	27	61
Glycerine:		
100 per cent.....	(*)	7
50 per cent.....	4	6
25 per cent.....	10	20
12.5 per cent.....	30	27
6.25 per cent.....	42	42
Sodium chloride solution:		
100 per cent.....	(*)	8
50 per cent.....	(*)	3
25 per cent.....	4	10
12.5 per cent.....	10	17
6.25 to 0.1 per cent.....	40	27-36
Ox bile in salt solution: ^a		
50 per cent.....	70	70
25 per cent.....	70	70
12.5 per cent.....	70	70
6.25 per cent.....	70	70
3.125 per cent.....	70	70
Bouillon:		
+1 (37° C.) Shiga.....	70	0
-1 (37° C.) Shiga.....	4	0
+0.3 (37° C.) Shiga.....	63	0
--0.3 (37° C.) Shiga.....	2	0
Flexner dysentery:		
+0.3.....	63	0
--0.3.....	1	0
<i>Bacillus dysenteriae</i> + dried on paper (28° C.) Shiga.....	16	77

^a Not found.

^b Present until it dried completely.

TABLE 2.—Results of viability experiments with *Bacillus dysenteriae* and *B. coli* in normal fresh stool and normal sterilized stool.

Stool.	Salt solu- tion.	Bile, 50 per cent.	Stool inoculated with—		<i>B. dysen- teriae</i> sur- vived—	<i>B. coli</i> sur- vived—
			<i>B. dysen- teriae</i> .	<i>B. coli</i> .		
Normal fresh.....	+	0	+	0	3	>6
Do.....	+	+	+	0	5	>6
Normal sterilized.....	+	0	+	0	66	0
Do.....	+	+	+	0	75	0
Do.....	+	0	+	+	15	>21
Do.....	+	+	+	+	17	>21
Normal fresh inoculated and dried in desiccator.....	0	0	+	0	3	21
Normal sterilized inoculated and dried in desiccator.....	0	0	+	0	12	0

TABLE 3.—Viability of *Bacillus dysenteriae* and *B. coli* in dysenteric stools placed in various media.

Stool No.	Reaction to litmus.	Type of <i>Bacillus</i> <i>dysenteriae</i> isolated.	Stool.		Salt solution.		Water.	
			<i>B. dy- sen- teriae</i> .	<i>B. coli</i> .	<i>B. dy- sen- teriae</i> .	<i>B. coli</i> .	<i>B. dy- sen- teriae</i> .	<i>B. coli</i> .
2.....	—	Flexner.....	1	>16	9	>16	7	>16
8.....	+	Shiga.....	4	>6	3	>6	0	0
9.....	+	do.....	2	>6	4	>6	0	0

Stool No.	Tap water.	Bouillon.				Bile, 50 per cent.	Dried in desiccator.	
		+1		—1				
		<i>B. dy- sen- teriae</i> .	<i>B. coli</i> .	<i>B. dy- sen- teriae</i> .	<i>B. coli</i> .	<i>B. dy- sen- teriae</i> .	<i>B. coli</i> .	<i>B. dy- sen- teriae</i> .
2.....		7	>16	9	>16	7	>16	7
8.....		0	0	0	0	0	>6	—
9.....		0	0	0	0	0	>6	—

AN EPIDEMIOLOGICAL STUDY IN LEPROSY¹

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and

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The methods of transmission of leprosy have, thus far, not been satisfactorily ascertained, largely because of difficulty in finding a susceptible animal and in growing the organism.

Epidemiological studies have been made, based on statements obtained from the patients themselves, and by studying their surroundings; but, though some of the results are sufficiently suggestive to give rise in the minds of many students of leprosy to actual belief with reference to the means of transmission, there have been no reports sufficiently definite or covering a sufficient number of cases to warrant any assumption of positiveness.

It was proposed in 1923, as a part of the plan for leprosy investigation in the Philippines, to study the disease from the epidemiological standpoint and we agreed to begin the work and, after finding the method that should appear the most profitable to follow from this standpoint, to instruct a group of workers and to compile the results and coördinate efforts in this direction.

¹The data on which this study is based were obtained at San Lazaro Hospital, the contagious-disease hospital of the Philippine Health Service in Manila. Practically all of the cases hospitalized for leprosy in that institution at the time the survey was made were interviewed to obtain this material. We wish to express our sincere appreciation to Dr. Vicente de Jesus, Director of Health, for the opportunity to do this work, and to the officers of San Lazaro Hospital for their courtesy and assistance. We also acknowledge our indebtedness to the patients in the leper department who acted as interpreters, and especially to Mr. Reyes, our chief interpreter, who also attended to the collection of the patients and tabulation of the lists.

²Member, United States Army Medical Department Research Board, Bureau of Science, Manila.

Because of the difficulty in finding suitable personnel in the Philippine Health Service who could be spared to undertake the work only a preliminary study was made and it forms the subject of this paper. It is believed that it suggests the advisability of continuing such a study until a much larger group has been covered, as the number of cases on which this paper is based is manifestly too small to warrant conclusions. It is believed, however, that such figures as appear may be utilized with others, by combination, to build up larger series.

No reference will be made here to the studies that have been published in the past, as this small addition does not justify such reference without a complete review of the work along this line to date. This we are unable to undertake at the present time.

It is said that all morphine habitués are liars. On somewhat the same principle, particularly in a land where segregation of lepers is practiced, it is extremely difficult to obtain reliable information as to onset and family history. The reasons are many and will bear citation or re-citation. Even in India, where compulsory segregation is not practiced to any extent, it is difficult to obtain reliable data. In the Philippines there is the fear that the patient, by giving information, may cause the compulsory segregation of friends or relatives who are dear to him, a fear which his faith in the efficacy of treatment is not sufficient to overcome. The leper who has become negative has greater faith, yet few have much, for it appears from this rather careful study that the majority attribute their cure to some other influence (religious) or to the natural course of events; in other words, to chance rather than to the efficacy of the treatment. Few, even of the more intelligent, consider that the disease is transmitted from person to person; they incline to the theory that it is due to exposure, particularly to a wetting, or to a bath when overheated or exhausted. The relatively low infection rate naturally makes it difficult to prove the point to them, and they see little to distinguish leprosy in its contagiousness from beriberi, which is common and which they realize can be avoided in other ways than by keeping from contact with sufferers from the disease. Therefore, they judge that the questioners are "barking up the wrong tree," as we say, and are noncommittal in their answers to questions, correct reply to which might cause trouble to their loved ones.

Many, however, are honest when they state that they have never known a leper, or that they are unable to give satisfactory answers to questions regarding some of their symptoms. They really do not know, either by reason of forgetting occurrences which to them are unimportant or by reason of never having noticed them. Not every patient, even though the questions are put to him in his own dialect, can understand what the investigator is trying to learn.

To enable us to get the greatest possible accuracy in this group, we selected an especially qualified and intelligent man as interpreter for each dialect. One of us (Theodore Bitterman), who did most of the questioning, speaks Spanish and understands enough words of some of the dialects to catch the trend of the answers. The patients were questioned carefully and cross-questioned, particularly in regard to contacts. The results of this method are well illustrated by a man who denied knowing any lepers prior to segregation. The third or fourth patient questioned after him, a much younger man, had the same name and came from the same province and the same barrio. He also denied knowing any leper prior to segregation; but, when these two were called to the questioner's table at the same time they acknowledged they were father and son and that each knew the other had leprosy before the admission of either. Why such a denial should be made is beyond our comprehension, nor could we get from them the reason therefor. One might think that it might be attributed partly to their lack of knowledge of the manifestations of the disease. The careful way in which they are able to describe their symptoms, giving dates (to the date of the month, even when the onset occurred years before), indicates the contrary. We believe that the manifestations of leprosy are extremely well known to all who are able to comprehend and that they themselves make presumptive diagnoses very early in the course of the disease. We believe that the most accurate details of our study are the figures as to date of onset and of the first symptom noticed.

Of course, we have not the experience to warrant a positive statement as to what constitutes the earliest symptom. If the primary recognizable lesion is a break in the surface epithelium of any kind or is an ulceration of the nasal mucosa, these people might easily miss it, as it probably would not be characteristic in the presence of the many confusing skin conditions of the Trop-

ies; but anaesthesia, even of a small area, is quickly noticed by them, as are also the peculiar macules and nodules characteristic of the disease.

TABLE 1.—*Incidence of first lesion, by location on body.*

	Foot and ankle.	Leg.	Thigh, buttock.	Arm and hand.	Neck, face, and ear.
Anæsthesia.....	114	38	4	33	5
Red spots and cutaneous patches.....	2	2	—	4	16
Nodules.....	—	1	—	3	4
White patches.....	—	1	2	4	5
Ulcers.....	—	—	—	—	1
Total.....	116	42	6	44	31
Percentage.....	46.9	16.4	2.4	17.7	12.5
	Body.	Total.	Per cent.	Extremities.	Per cent.
Anæsthesia.....	—	194	78.2	185	91.6
Red spots and cutaneous patches.....	4	28	11.6	8	3.9
Nodules.....	—	8	3.2	4	1.9
White patches.....	5	17	6.8	5	2.7
Ulcers.....	—	1	—	—	—
Total.....	9	248	—	202	81.5
Percentage.....	3.6	—	—	—	—

Table 1 shows the location and character of the first lesion. Attention is invited to the preponderance of anaesthesia as the primary symptom, 78.2 per cent; also of the exposed parts of the extremities as the location, 81.5 per cent. Only a few children were included in the series, and in children only was the buttock given as the site of the first lesion noticed. If we add the head, face, and neck, our percentage of exposed parts being first affected becomes 94 per cent, while the addition of the four buttock cases gives us 95.5 per cent. This high percentage can not be without some significance, even in so small a series; and though, as stated before, the work here reported does not warrant conclusions, we have a very strong belief that infection arises, in the majority of cases, through contact of leprous material with solutions of continuity of the skin surface. We also consider it probable that material may find suitable soil for growth in lesions of the mucous membrane. This is of especial importance in the nose, as the contagious material is carried there through the agency of the fingers.

The preponderance of first noticed lesions in the foot and ankle is particularly interesting, nearly half (47 per cent) of such

lesions being in this part and, including the leg, 158, or 63 per cent, in the lower extremity.

The same localization, according to our observations, occurs in yaws in children. Adults acquire the disease from their offspring in a considerable percentage of cases, and in them the lesion is most apt to be on a part of the body in contact with the child, as the arm or waist, according to whether the child is carried on the arm or astride the hip at the waist line.

This localization adds strength to the theory of infection through skin wounds. Such wounds are almost universally present in children and those of the foot and ankle are the most frequent, the incidence diminishing very gradually to the knee, while the hands and arms show a frequency about equal to that of the leg. A considerable proportion of these lesions are skin disease or bites of insects which become infected, itch, and are promptly scratched by fingers and made worse. Any material, present on the hands, capable of infection, is offered an ideal place to grow and multiply.

Such leprosy infections cited in the literature as have been observed to follow contact have been the result of wounds with an instrument contaminated by contact with a leper.

We consider that there is evidence that an intact integument is an excellent protection against the disease although the small rates of infection in consorts indicate the presence of some other type of resistance, either age per se or a gradually acquired immunity.

Table 2 shows that contacts were admitted in only 36.9 per cent of the cases and, with the exception of close relatives, were frequently stated to have been very slight. In the immediate family or among relatives the nephew, niece, son, and daughter were cases of later occurrence than the uncles and the parents, all of whom were also in the hospital and were included in the series. Aside from the immediate family (parents, brothers, and sisters) the contacts with many in the nonrelative group may have been fully as intimate as with members of the family. We will dismiss this table with only a plea for the continuance of the study of lepers from this standpoint, not with the idea that more will be found who will admit contacts than those who will not, but that additional data may be obtained as to the nature of the contact which is most likely to produce infection and as to the age at which such contact is most dangerous.

Table 2 shows figures on contacts with relatives and with nonrelatives as adduced from a study of ninety-nine lepers.

TABLE 2.—*Leper contacts.*

Relatives:	Non-relatives:		
Cousin	10	Acquaintance	19
Sister	9	Friend	12
Brother	6	Neighbor	9
Father	6	Schoolmate	2
Mother	5	Coworker	2
Uncle	2	Companion	2
Nephew	2	Housemate	1
Son	2	Barber	1
Daughter	2	Restaurant keeper	1
Father, brother, and uncles	1		
Father, brother, and others	1		49
Grandmother	1		
Son-in-law	1		
Niece	1		
Brother-in-law	1		
	50		

Total admitting contacts 99, or 36.9 per cent.

The average length of time between the occurrence of the first symptom and segregation is shown in Table 3.

TABLE 3.—*Lapse of time between appearance of first lesion and segregation.*

Segregation.	Cases.	Average duration per case prior to segregation.
		Years.
Voluntary.....	169	2.76
Not voluntary.....	90	2.46
Combined.....	259	3

These results are only approximate, insofar as the data with reference to voluntary segregation are concerned. Patients who report voluntarily are allowed to remain at San Lazaro Hospital, as far as possible, instead of being sent to Culion; as a result those who feared detection or were threatened with exposure by their enemies reported, and others when discovered were allowed to report "voluntarily." The idea that they might remain at San Lazaro, added to the news that a better treatment could be given, was responsible for a decided increase in voluntary submission of early cases in 1922 and 1923.

It is probably true that a leper who has only anaesthetic lesions is not likely to transmit the disease, but our present knowledge

with reference to the infectiousness of leprosy is based almost entirely on observations which lack exactness. Those infected may, in the absence of lesions, excrete the organisms in some way in which bacilli can be found, just as is the case with persons infected with tuberculosis but who show no manifest lesions of the disease. We are, however, not justified by any means in saying that the appearance of any lepromatous lesions indicates that the case is from then on contagious. Nose ulcers and the cutaneous lesions in which the bacilli are found we consider contagious lesions. Open nasal lesions exist in some lepers who have only anaesthetic areas in addition; so that an undefined number of such cases are undoubtedly as dangerous as any. The figures in our tables, therefore, do not indicate that each leper who formed part of the group actually was capable of transmitting the infection for three years; but they do indicate that he might have been, and we have no means of telling just how many of the group were in such condition. We obtained other data with reference to this possibility of contagion; namely, the length of time each case remained outside the hospital after a positive diagnosis was made or the patient knew he had leprosy and, further, the interval between the first symptom and a skin lesion. From this information we could calculate the average time between the skin lesion and segregation. These data are most inaccurate, in our opinion. Many of the patients appreciated the significance of the question and such persons, particularly those who reported voluntarily, stated the date of diagnosis to have been within a few days of segregation.

Among the 259 cases who furnished data the average time between the first symptom and diagnosis was 2.47 years; between diagnosis and segregation, 0.42; between first symptom and skin lesion, 1.12; between first symptom and segregation, 3; between skin lesion and segregation, 1.88.

These 259 cases, then, were in all probability actually exposing others for 1.88 years, or 1 year 10.5 months, before segregation. Most of these cases are early and not at all representative of the cases of the past. Gradually since 1906, when segregation at Culion was commenced, the lepers who presented themselves and those forcibly isolated, have shown fewer and fewer advanced cases. It is rare now to see advanced cases, which formed a large part of the early groups. In many of the suspects to-day careful microscopical examination is required in order that the diagnosis can be verified.

We have no practicable method of determining how many lepers there are still unsegregated; they probably equal in number those who are segregated, approximately 5,000. If we assume for these the same average length of time between skin lesion and segregation one gets some idea of the exposure rate. This interval is being shortened in increasing proportion as the present methods of handling lepers are continued, and the ratio of decrease will increase more and more rapidly if the present efforts can be maintained. We expect this because of the beneficial results now being achieved and which can be improved if the work, both in other countries and in the Philippines (where the most intensive effort so far put forth in the history of the fight against leprosy is in progress), can be continued and pushed to its greatest development.

The age of appearance of the first symptoms in the 245 cases of this series in which reliable data were obtained confirms the figures published heretofore by many leprologists. The number is too small and the lower-age groups are not sufficiently represented to justify any conclusions from these alone, but this study adds a few statistics that can be combined with future reports. The figures in Table 4 show the incidence of the symptoms first recognized, according to age and sex.

TABLE 4.—*Incidence by age and sex of first recognized symptoms.*

Age group. Years.	Males.		Females.		Total.	
	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.
5 to 9.....	39	22.1	17	24.6	7	28 22.8
10 to 14.....					49	20
15 to 19.....	27	15.3	11	15.9	38	15.9
20 to 24.....	31	17.6	11	15.9	42	17.1
25 to 29.....	23	13	6	8.7	29	11.4
30 to 34.....	27	15.3	9	13	21	8.6
35 to 39.....					15	6.1
40 to 44.....					36	
45 to 49.....	19	10.7	10	14.5	18	7.3
50 to 59.....	4	2.2	4	5.8	11	4.4
60 to 80.....	6	3.4	1	1.4	8	3.2
Total.....	176	71.8	69	28.2	245	2.8

The difference between the rate for males and that for females is not sufficient to be suggestive. The graph (fig. 1) indicates the trend of the data in Table 4. More figures are needed to make the results of sufficient value to warrant conclusions.

We feel that further discussion of the data obtained in this study is not warranted. Many very interesting stories were obtained in taking the histories of these patients, including a few weird tales of exciting causes in which the patients thoroughly believe.

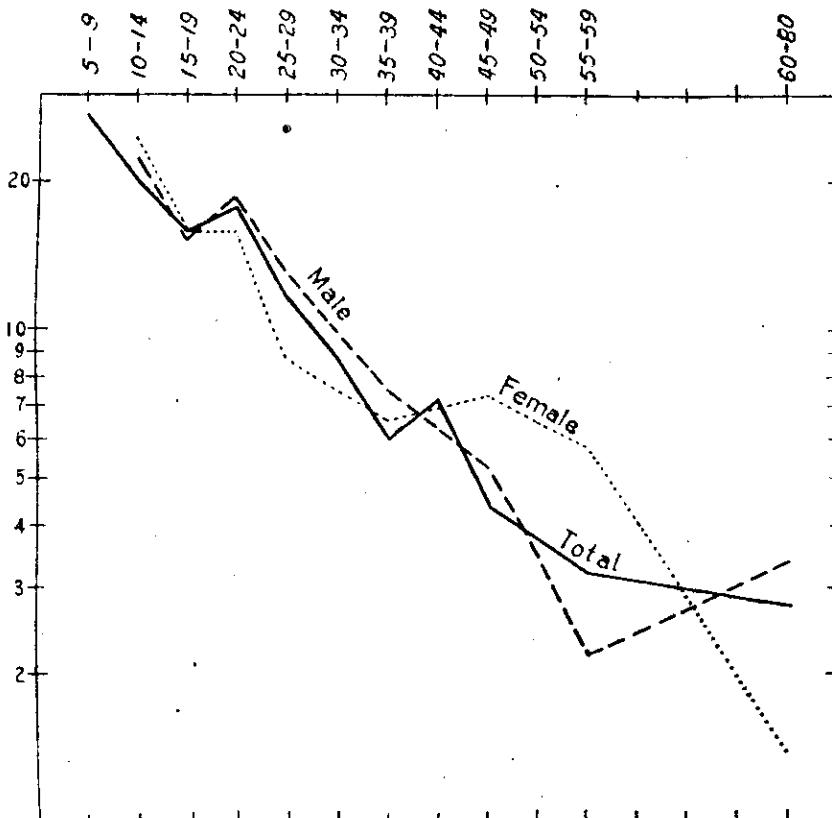


FIG. 1. Incidence by age and sex of first recognized symptoms.

Many were treated for some time before being segregated. One or two might still be continuing treatment from private physicians except that their means became exhausted. If the skin lesions do not involve the face, or until such appear, the leper stands little risk of being apprehended. If we could afford to make the present methods of treatment available to all and the victims could be persuaded of the necessity for keeping apart from the noninfected, more especially from children, the problem would soon be solved.

SUMMARY

A brief study of some of the epidemiological aspects of the histories of 259 lepers is presented in an effort to stimulate the continuance of this method of research in leprosy in the Philippine Islands. The material is here and under control, and a Filipino should be able to get more reliable data than was possible for two Americans.

Additional evidence is presented in this study that the earliest recognizable lesion is an anæsthetic area.

These data on the location of the primary lesion add to the data reported by others and favor the theory that the organism enters the body through abrasions or similar wounds in the integument of the exposed parts of the body.

The age at which the first symptom appeared in the cases of this series also agrees with the findings of others, that the more susceptible ages are in the first decades, although no age appears exempt, unless we extend the possible incubation period beyond reasonable limits.

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ILLUSTRATION

TEXT FIGURE

FIG. 1. Incidence by age and sex of first recognized symptoms of leprosy.

NEW SPECIES OF PHILIPPINE PLANTS COLLECTED BY A. LOHER

By ELMER D. MERRILL

Of the University of California, Berkeley

In June, 1923, Mr. A. Loher, a long-time resident of Manila, presented to the Bureau of Science his entire collection of botanical material prepared by him between the years 1908 and 1915. The collection contains over 3,000 numbers (Nos. 12,000 to 15,170), and in it there are represented approximately 1,500 species of ferns and flowering plants. With the exception of a few numbers from the vicinity of Lake Mainit, Surigao Province, Mindanao, and from Polillo Island, and a somewhat larger number from the Caraballo Mountains in Nueva Vizcaya Province, Luzon, the bulk of the collection comes from the mountainous region northeast of Manila, mostly from Rizal Province, but with an interesting series of species from the Umirey River region on the Pacific coast in Tayabas Province, Luzon. The localities are Montalban, Balacbac, Balintingan, Angilo, Mabiluang, Bantol, Puray, Guinuisan, Pinauisan, Sumag, Paningtinggan, Siya Bundoc, and Lucutan—all in Rizal Province—and the Umirey region in Tayabas Province contiguous to the eastern boundary of Rizal Province.

Those parts of Rizal and Tayabas Provinces are exceedingly rough, characterized by numerous rugged mountains which attain altitudes of from 900 to 1,800 meters, the peaks and ranges being separated by deep gorges. Field work there is exceedingly difficult on account of the rough nature of the country, the difficult trails, and the sparse, primitive population. Many places are entirely inaccessible in the rainy season because of the fact that the few existing trails frequently follow the stream beds, and thus become impassable in times of flood or high water. A large part of the Loher collection came from the more inaccessible parts of this region; access to these distant parts of Rizal Province, and to the Umirey region in Tayabas Province is only on foot, over difficult trails, and involves toilsome journeys of sev-

eral days from Manila. Just how difficult field work in botany is in such regions can be appreciated only by those who have accomplished it.

Although in relatively close proximity to Manila, the various mountains being readily visible from the city, the region has never been thoroughly explored, although collectors of the Bureau of Science, notably Ramos, Reillo, and Edaño, have made extensive botanical collections there during the past fifteen years. Those collections yielded very numerous previously undescribed forms, the descriptions of which have been published from time to time. The Loher collection naturally contains numerous representatives of these species; but it also contains a considerable number of forms not hitherto represented by any collections that have been available to me for study. The present paper consists almost entirely of descriptions of new species based wholly on the Loher collection; a total of 41 is here proposed.

Shortly after the collection was presented to the Bureau of Science it became necessary for me to leave Manila on an official trip to Australia. I planned to study the material immediately after my return to Manila early in October, 1923, but unexpectedly left for the United States on November 4, and it was thus impossible for me to do more than make a preliminary examination of the material. At my request the entire collection was shipped to me at Berkeley, and the identifications have been completed here. The task has been a rather difficult one, because of the fact that I have not had access to the type material and to the very extensive general collections in the herbarium of the Bureau of Science for purposes of comparison, but have had to a large degree to depend on my memory of the characters of previously described species supplemented by the published descriptions.

Types of all species described are deposited in the herbarium of the Bureau of Science, and a representative of each new species has been deposited in the herbarium of the University of California. Duplicates of the general collection, so far as these have been available, have been distributed to other botanical institutions; by far the largest set, at Mr. Loher's request, was sent to the herbarium of the University of Munich. In general, however, duplicate material is limited, rarely exceeding four or five specimens under each number, many numbers being represented by only one or two duplicates.

URTICACEÆ

Genus PILEA Lindley

Pilea loheri sp. nov.

Herba glabra, erecta, parce ramosa, circiter 20 cm alta; foliis in paribus valde inaequalibus, membranaceis, ovatis ad oblongo-ovatis, olivaceis, utrinque cystolithis numerosis perspicuis instructis, acutis vel acuminatis, basi 3-plinerviis, margine incurvato-serratis, majoribus 2 ad 3 cm longis, basi acutis, minoribus 1 cm longis, basi late rotundatis vel subcordatis; inflorescentiis axillaribus, tenuibus, quam petiolo, multo longioribus, cymulis plerumque 2, 4 ad 6 mm diametro, floribus confertis; sepalis ♀ 3, valde inaequalibus, majoribus concavis, 1.5 mm longis; acheniis ellipsoideis, compressis, laevis, 1.5 mm longis.

An erect, sparingly branched, glabrous herb about 20 cm high, the stems 2 mm in diameter, the branches slender. Leaves in unequal pairs, olivaceous, paler beneath, dull, membranaceous, ovate to oblong-ovate, with numerous, conspicuous, irregularly disposed cystoliths on both surfaces, acute or somewhat acuminate, 3-plinerved, the margins with conspicuous incurved serrations, the larger ones of each pair 2 to 3 cm long, 1.5 cm wide, base acute, the smaller ones about 1 cm long, their bases broadly rounded or subcordate, the petioles of the larger leaves 1 cm, of the smaller ones 2 mm in length. Inflorescences axillary, slender, 1.5 to 2.5 cm long, each bearing usually two densely flowered cymules 4 to 6 mm in diameter. Pistillate flowers with three very unequal calyx segments, the largest one concave, 1.5 mm long, the two smaller ones less than 1 mm long. Achenes elliptic, compressed, rounded, smooth, about 1.5 mm long.

LUZON, Rizal Province, Balintingan, Loher 12797, July, 1909.

Among the Philippine species a strongly marked form falling in the general group with *Pilea benguetensis* C. B. Rob., but not at all closely allied to it.

LAURACEÆ

Genus CINNAMOMUM Tournefort

Cinnamomum loheri sp. nov.

Arbor glabra (floribus ignotis), ramulis rubro-brunneis, circiter 3 mm diametro; foliis crasse coriaceis, oblongo-ovatis ad oblongo-ellipticis, 7 ad 10 cm longis, 3 ad 4 cm latis, in siccitate pallide brunneis, nitidis, subtus subglaucouscentibus, apice dis-

tincte acuminatis, basi acutis, perspicue 3-plinerviis, reticulis obscuris; infructescens glabris, depauperato-paniculatis, foliis subaequantibus; fructibus globosis, 1.5 cm diametro, calycis persistentibus crassis, subdisciformibus, truncatis, 1 cm diametro.

A glabrous tree (flowers unknown), the branches reddish brown, subterete, the ultimate ones about 3 mm in diameter. Leaves thickly coriaceous, oblong-ovate to oblong-elliptic, 7 to 10 cm long, 3 to 4 cm wide, pale brownish and shining on the smooth upper surface when dry, the lower surface subglaucous, the apex distinctly acuminate, base acute, very prominently 3-plinerved, the reticulations obscure; petiole 10 to 12 mm long. Infructescences glabrous, about as long as the leaves, each bearing a few globose fruits about 1.5 cm in diameter, the persistent calyces disklike or somewhat saucer-shaped, thickly coriaceous, truncate, 1 cm in diameter.

Luzon, Rizal Province, Mabiluang, Loher 14469, October, 1913.

A species in vegetative characters resembling *Cinnamomum mercadoi* Vid., but with radically different fruits, the rather large globose fruits being seated on, not at all inclosed by, the conspicuous, thickened, truncate, disklike or very shallowly saucer-shaped, accrescent calyces.

Genus CRYPTOCARYA R. Brown

Cryptocarya loheri sp. nov.

Arbor, ramulis inflorescentiisque perspicue ferrugineo-pubescentibus; foliis glabris vel subtus ad costa nervisque plus minusve ferrugineo-pubescentibus, chartaceis, acuminatis, basi acutis, oblongis ad oblongo-ellipticis, 9 ad 15 cm longis, 3 ad 6 cm latis, in siccitate supra olivaceis vel pallidis, subtus brunneis, nervis utrinque 8 vel 9, valde perspicuis, curvato-subadscendentibus, subminute subfoveolato-reticulatis; paniculis circiter 15 cm longis, multifloris, floribus 3.5 mm longis, pubescentibus, lobis ellipticis, 2 mm longis; filamentis leviter pubescentibus, ovario glabro.

A tree, the branchlets and inflorescences conspicuously ferruginous-pubescent. Leaves chartaceous, oblong to oblong-elliptic, 9 to 15 cm long, 3 to 6 cm wide, when dry pale olivaceous on the glabrous upper surface, the lower surface brown, not at all glaucous, the midrib and lateral nerves more or less ferruginous-pubescent, becoming glabrous or nearly so, the base acute, apex prominently acuminate; lateral nerves 8 or 9 on each side of the midrib, prominent, curved-subascending, scarcely anastomosing,

the ultimate reticulations forming shallow but small and rather close foveolæ; petioles 7 to 10 mm long, usually pubescent. Panicles terminal and in the upper axils, up to 15 cm long, many-flowered, ferruginous-pubescent. Flowers 3.5 mm long, pubescent, the perianth lobes elliptic, 2 mm long. Filaments slightly pubescent. Ovary and style glabrous.

Luzon, Rizal Province, Montalban, Loher 12349 (type), 12350, October, 1909.

Probably as closely allied to *Cryptocarya oblongata* Merr. as any hitherto described species, differing especially in its fewer-nerved leaves.

LEGUMINOSÆ

Genus BAUHINIA Linnaeus

Bauhinia pachyphylla sp. nov. § *Phanera*.

Frutex scandens, inflorescentiis densissime castaneo-pubescentibus exceptis glaber; foliis suborbicularis, crasse coriaceis, circiter 10 cm longis, usque ad $\frac{1}{2}$ divisis, lobis obtusis, basi late rotundatis, distincte cordatis, perspicue 11-nerviis; inflorescentiis terminalibus, stricte racemosis, densissime castaneo-pubescentibus, 20 ad 30 cm longis; floribus pedicellatis, circiter 4.5 cm longis, calyxis tubo 2 cm longo, basi cuneato, lobis oblongis, circiter 1.6 cm longis; petalis unguiculatis, 2.5 cm longis, extus pubescentibus, lamina elliptica, 1.5 cm longa; staminibus fertilibus 3, filamentis glabris, 1.5 cm longis, antheris oblongis, 7 mm longis; ovario dense pubescente.

A scandent shrub, glabrous except the very densely castaneous-pubescent inflorescences, the ultimate branches brown, terete, about 5 mm in diameter. Leaves suborbicular, 2-lobed, thickly coriaceous, brown when dry, about 10 cm in diameter, divided about one-third to the base, the lobes ovate, obtuse, the base broadly rounded, distinctly cordate, 11-nerved, the nerves very prominent, reticulations distinct; petioles stout, about 1.5 cm long. Inflorescences terminal, strictly racemose, 20 to 30 cm long, very densely pubescent with castaneous hair, marked with the conspicuous scars of fallen pedicels, flowering only near the top. Flowers pale yellow (castaneous when dry), about 4.5 cm long, their pedicels stout, up to 2 cm long, the buds obtuse. Calyx tube cylindric, narrowed below to the cuneate base, about 2 cm long, the lobes oblong, acute, about 1.6 cm long, 4.5 mm wide, densely pubescent externally. Petals clawed, about 2.5 cm long, pubescent externally, the limb elliptic, rounded, base acute, about 1.5 cm long, 1.2 mm wide. Fertile stamens 3, their fila-

ments glabrous, 1.5 cm long, the anthers oblong, 7 mm in length. Ovary stipitate, oblong, densely pubescent; style short. Pods oblong, thin, flat, somewhat ferruginous-pubescent, becoming nearly glabrous, smooth, about 13 cm long, 3.5 cm wide. Seeds suborbicular to ellipsoid, compressed, flat, nearly black, shining, 1.5 to 1.8 cm long.

Luzon, Rizal Province, Balintingan, Loher 12978, April, 1915, altitude about 1,400 meters.

A strongly marked species, not closely allied to any of the hitherto described Philippine forms, well characterized by its thickly coriaceous leaves and its stout, densely castaneous-pubescent racemes and flowers.

RUTACEÆ

Genus MICROMELUM Blume

Micromelum caudatum sp. nov.

Arbor parva, partibus junioribus inflorescentiisque exceptis glabra; foliis 20 ad 30 cm longis, foliolis circiter 7, chartaceis, glabris, oblongo-ovatis ad oblongo-lanceolatis, inaequilateralibus, integris, caudato-acuminatis, 6 ad 11 cm longis, 2.5 ad 4 cm latis, nervis utrinque 5 ad 7, distinctis, subtus in axillis perspicue glandulosis; inflorescentiis cymosis, 5 ad 8 cm diametro, dense breviter cinereo-pubescentibus; floribus numerosis, petalis oblongis, 4 mm longis, extus dense pubescentibus; filamentis longioribus 4 mm, brevioribus 3 mm longis; ovario cylindrico, parce hirsuto, stylis cylindricis, circiter 1 mm longis.

A small tree, glabrous except for the slightly pubescent younger parts and the rather densely pubescent inflorescences, the branches and branchlets pale, terete. Leaves 20 to 30 cm long, the leaflets about 7, chartaceous, glabrous, usually pale olivaceous, oblong-ovate to oblong-lanceolate, caudate-acuminate, the base inequilateral, acute on both sides or rounded on the broader side; lateral nerves 5 to 7 on each side of the midrib, prominent, with a large depressed gland (domatia) in each axil on the lower surface, glandular-punctate, the reticulations obsolete. Cymes terminal, 5 to 8 cm in diameter, densely cinereous-pubescent with short hairs, many-flowered. Calyx pubescent, somewhat cup-shaped, about 2 mm in diameter, obscurely toothed. Petals oblong, pubescent externally, 4 mm long. Longer filaments 4 mm, shorter ones 3 mm in length. Ovary cylin-

dric, sparingly hirsute; styles cylindric, glabrous, about 1 mm long.

Luzon, Rizal and Tayabas Provinces, Montalban and Umirey, Loher 12822, 12859, 13615 (type), 14409, flowering in March, April, and May.

A species most closely allied to *Micromelum curranii* Elm., but with smaller cymes, smooth, not verruculose leaves which have prominent depressed glands in the axils on the lower surface, and somewhat hirsute, not glabrous ovaries.

Genus CLAUSENA Burman f.

Clausena loheri sp. nov.

Arbor parva, inflorescentiis parce puberulis exceptis glabra; foliis circiter 50 cm longis, foliolis circiter 7, chartaceis, oblongis, integris, in siccitate pallidis, acuminatis, basi plerumque inaequilateralibus, perspicue glandulosis, 12 ad 17 cm longis, 4 ad 6 cm latis, nervis utrinque circiter 9, perspicuis; paniculis terminalibus, usque ad 25 cm longis, floribus numerosis, 5-meris, calycis 2 mm diametro, lobis brevibus, acutis; petalis oblongo-ellipticis, obtusis, 4 mm longis, glabris; antheris 1.5 mm longis, obtusis; ovario glabro, ovoido, rugoso, stylis cylindraceis, vix 1 mm longis.

A small tree, entirely glabrous except the obscurely cinereous-puberulent panicles, all parts, branches, leaves, and flowers conspicuously glandular, the branches pale when dry. Leaves about 50 cm long, the leaflets about 7, chartaceous, pale when dry, entirely glabrous, entire, oblong, 12 to 17 cm long, 4 to 6 cm wide, shortly acuminate, base usually inequilateral, rounded on one side, acute on the other; lateral nerves about 9 on each side of the midrib, prominent, anastomosing, the reticulations distinct. Panicles narrowly pyramidal, terminal, up to 25 cm long, the flowers numerous, white, 5-merous. Calyx about 2 mm in diameter, the lobes short, acute, obscurely ciliate, glandular. Petals oblong-elliptic, obtuse, glandular, 4 mm long. Anthers 1.5 mm long, obtuse. Ovary ovoid, glabrous, glandular, rugose, the style cylindric, less than 1 mm long.

Luzon, Rizal Province, Montalban, Loher 12110 (type), 13286, 14357, flowering in April and May.

This may ultimately prove to be but a large-leaved form of *Clausena anisum-olens* (Blanco) Merr., from which it differs in its entire, larger leaflets and in various other characters.

MELIACEÆ

Genus **DYSOXYLUM** Blume

Dysoxylum loheri sp. nov. § *Eudysoxylum*.

Arbor parva, foliis 45 ad 90 cm longis, foliolis 15 ad 21, oblongis, oppositis, sessilibus, 11 ad 16 cm longis, 4 ad 5 cm latis, subtus molliter pubescentibus, acutis ad breviter acuminatis, basi rotundatis, plerumque inaequilateralibus, chartaceis ad subcoriaceis, nervis utrinque circiter 20; floribus caulinis, e tuberculis magnis, fasciculatis, vel in racemis paucifloris fasciculatis, vel in ramis subsolitariis, 4-meris, circiter 17 mm longis; calycis membranaceis, inflatis, cylindraceis, dense maculatis, extus leviter ciliatis, 3-lobatis, lobis late ovatis, 3 ad 4 mm longis; petalis 4, liberis, extus pubescentibus, ligulatis, 16 mm longis; tubo 15 mm longo, cylindrico, glabro, apice 8-lobato, lobis oblongis, 2 mm longis; antheris 8, oblongis, 1.5 mm longis; ovario dense villoso, stylis in partibus inferioribus dense villosis, sursum glabris.

A small tree, the leaves 45 to 90 cm long, the rachis up to 5 mm in diameter, densely pubescent; leaflets 15 to 21, sessile, opposite, oblong, chartaceous to subcoriaceous, 11 to 16 cm long, 4 to 5 cm wide, acute to shortly acuminate, base rounded, mostly inequilateral, the upper surface olivaceous, glabrous or nearly so, the lower surface softly and rather densely pubescent; lateral nerves about 20 on each side of the midrib, rather prominent, spreading, the reticulations obsolete. Flowers white, borne on the trunk and larger branches, those on the trunk from large tubercles, here often racemose, those on the branches solitary or subsolitary, the pedicels up to 10 mm long, slightly ciliate, the racemes when present short, with but 2 or 3 flowers. Calyx inflated, membranaceous, cylindric, 9 mm long, slightly ciliate, with very numerous small brownish maculæ, 3-lobed, the lobes broadly ovate, acute or obtuse, 3 to 4 mm long. Petals 4, free, ligulate, 16 mm long, 2.8 mm wide, pubescent on the back in the upper half. Staminal tube cylindric, 15 mm long, about 3 mm in diameter, glabrous, the apex 8-lobed, the lobes oblong, 2 mm long, truncate or slightly retuse. Anthers 8, oblong, 1.5 mm long, inserted between the lobes of the tube. Disk cylindric, glabrous, 4 mm long, somewhat narrowed upward, crenulate. Ovary and lower half of the style very densely fulvous-villous, the upper half of the style glabrous.

Luzon, Rizal Province, Angilo, Loher 14181, March, 1914.

A species closely allied to *Dysoxylum robinsonii* Merr., differing especially in its larger leaves and more numerously nerved leaflets which are softly pubescent on the lower surface.

POLYGALACEÆ

Genus XANTHOPHYLLUM Roxburgh

Xanthophyllum loheri sp. nov.

Arbor, inflorescentiis exceptis glabra, ramis ramulisque tenuibus, teretibus, brunneis vel olivaceo-brunneis; foliis flavidis, oblongo-ovatis ad oblongo-ellipticis, subcoriaceis, 6 ad 7 cm longis, usque ad 3 cm latis, utrinque subaequaliter angustatis, basi acutis, apice breviter obtuseque acuminate, nervis utrinque 5 vel 6, distinctis, subtus in axillis haud glandulosis; paniculis terminalibus et in axillis superioribus, multifloris, cinereo-pubescentibus, foliis aequantibus; floribus parvis (ca. 6 mm longis) sepalis pubescentibus, inaequalibus, 2 ad 3 mm longis, obtusis; petalis 6 mm longis, angustioribus glabris, inferioribus extus ciliatis; ovario deorsum glabro, sursum pubescente; ovulis 8; stylis dense ciliatis.

A tree, glabrous except the cinereous-pubescent inflorescences, the branches and branchlets slender, terete, smooth. Leaves subcoriaceous, yellowish, oblong-ovate to oblong-elliptic, 6 to 7 cm long, 2.5 to 3 cm wide, subequally narrowed to the acute base and to the obtusely acuminate apex; lateral nerves 5 or 6 on each side of the midrib, distinct, the reticulations evident, rather close, the axils beneath eglandular; petioles 3 to 4 mm long. Panicles axillary and terminal, many-flowered, the individual ones equal to or shorter than the leaves, forming an ample leafy inflorescence. Pedicels pubescent, 3 mm long. Bracts oblong-ovate, 1.5 mm long. Flowers pale yellow, 6 mm long. Sepals unequal, ovate to elliptic, obtuse, pubescent, 2 to 3 mm long. Petals 6 mm long, the narrow ones glabrous, except their slightly pubescent lower margins, the lower broader one somewhat ciliate-pubescent on the back. Disk cup-shaped, fleshy, glabrous. Filaments somewhat ciliate. Ovary stipitate, glabrous below, pubescent above, 8-ovulate; style stout, curved, densely pubescent.

Luzon, Rizal Province, Balacbac, Loher 14978, June, 1912.

A species resembling and allied to *Xanthophyllum excelsum* (Blume) Miq. (*X. glandulosum* Merr.) but with smaller flowers and leaves, the vein axils eglandular beneath. It may possibly prove to be the same as *Xanthophyllum multiramosum* Elm.

which, rightly or wrongly, I have reduced to *X. excelsum* Miq., but which is known only from fruiting specimens.

EUPHORBIACEÆ

Genus *GELONIUM* Roxburgh

Gelonium stenophyllum sp. nov.

Frutex glaber (floribus exceptis), ramis ramulisque tenuibus, teretibus, vel ramulis ultimis obscure angulatis; foliis lanceolatis, 5 ad 11 cm longis, 1 ad 2 cm latis, chartaceis vel subcoriaceis, in siccitate pallidis, nitidis, margine plerumque recurvatis, utrinque angustatis, basi acutis, apice tenuiter acuminatis, rariter subacutis, nervis primariis utrinque circiter 12, distinctis, arcuato-anastomosantibus, reticulis laxis, distinctis; floribus sessilibus, axillaribus, solitariis vel depauperato-fasciculatis, sepalis leviter pubescentibus, obovatis ad ellipticis, 2.5 mm longis; staminibus circiter 17, filamentis 2 mm longis; fructibus subglobosis, circiter 1 cm diametro, seminibus 2 vel 3.

A glabrous shrub, the branches and branchlets slender, terete, or the ultimate branchlets obscurely angled, pale. Leaves lanceolate, 5 to 11 cm long, 1 to 2 cm wide, chartaceous to subcoriaceous, pale and shining on both surfaces when dry, margins usually recurved, narrowed to the acute base and to the slenderly acuminate, rarely subacute apex; lateral nerves about 12 on each side of the midrib, slender, distinct, arched-anastomosing, the reticulations lax, distinct; petioles 2 to 4 mm long. Stamineate flowers axillary, solitary or depauperate-fasciculate, sessile, white, the sepals sparingly pubescent, obovate to elliptic, about 2.5 mm long. Stamens about 17, their filaments 2 mm long. Fruit subglobose, shortly pedicelled, red, about 1 cm in diameter, 2- or 3-celled.

Luzon, Rizal Province, Montalban and Paningtingan, Loher 12639, 12929, 13345 (type), 15067, flowering in March and May, fruiting in October.

A species belonging in the group with *Gelonium philippinense* Pax and K. Hoffm., distinguished especially by its much narrower, very differently shaped, smaller, lanceolate, acuminate leaves and its much smaller fruits.

Genus *DIMORPHOCALYX* Thwaites

Dimorphocalyx loheri sp. nov.

Frutex vel arbor parva, subglabra, monoica; foliis confertis, chartaceis ad subcoriaceis, breviter petiolatis, oblongis ad

oblongo-ob lanceolatis, 5 ad 11 cm longis, obtusis ad obtuse acuminatis, basi cuneatis, margine distanter obscure serrulatis, nervis utrinque 8 ad 12, perspicuis; floribus ♂ fasciculatis, paucis, breviter pedicellatis, petalis elliptico-ovatis, 2 mm longis, staminibus 13; ♀ solitariis, pedicellatis, pedicellis ad 1.5 cm longis sursum incrassatis, sepalis oblongis, 4 mm longis, petalis ellipticis, rotundatis, circiter 5 mm longis, ovario dense pubescente.

A monoecious shrub or small tree, nearly glabrous. Branches brown, terete, glabrous, the tips of the branchlets slightly pubescent. Leaves crowded on the branchlets, chartaceous to subcoriaceous, oblong to oblong-ob lanceolate, glabrous, or when young sparingly appressed-pubescent, 5 to 11 cm long, 2 to 3 cm wide, the upper surface dark olivaceous, the lower surface pale when dry, apex obtuse to shortly and obtusely acuminate, base cuneate, margins distantly and obscurely serrulate or apiculate-serrulate; lateral nerves 8 to 12 on each side of the midrib, prominent on the lower surface, arched-anastomosing, reticulations few, very lax; petioles 3 to 5 mm long. Staminate flowers few, axillary, fascicled, their pedicels in anthesis up to 3 mm long, somewhat pubescent. Sepals ovate, obtuse, slightly pubescent, 1 mm long. Petals glabrous, elliptic-ovate, rounded, 2 mm long. Stamens 13, nearly free, glabrous, about 1 mm long. Pistillate flowers solitary, few, on the same branches as the staminate ones, their pedicels thickened upward, pubescent up to 1.5 cm long. Sepals oblong, 4 mm long. Petals elliptic, rounded, 5 mm long, 3.5 mm wide. Ovary densely pubescent; styles cleft nearly to the base, about 2 mm long.

Luzon, Rizal Province, Montalban, Loher 12467 (type), 14847, June, 1909, and December, 1913.

A species allied to *Dimorphocalyx denticulatus* Merr. but the leaves not slenderly acuminate, the staminate flowers fascicled, and the ovaries densely pubescent.

AQUIFOLIACEÆ

Genus ILEX Linnæus

Ilex loheri sp. nov.

Species *I. buergeri* Miq. affinis, differt foliis majoribus, usque ad 13 cm longis et 6 cm latis.

A tree, entirely glabrous except the somewhat puberulent inflorescences, the branches and branchlets pale, rugose, the latter irregularly angled, about 3 mm in diameter. Leaves coriaceous, oblong to oblong-elliptic, 9 to 13 cm long, 3 to 6 cm wide, the

upper surface pale olivaceous, slightly shining, the lower surface paler than the upper, subequally narrowed to the acute base and to the blunt-acuminate apex, the acumen 1 to 1.5 cm long, the margins distantly and rather obscurely undulate-crenate, each crenulation with a distinct black gland; lateral nerves about 10 on each side of the midrib, slender, distinct, arched-anastomosing, the reticulations very lax, slender, not prominent; petioles 1 to 1.7 cm long. Flowers axillary, 4-merous, about 8 mm in diameter, fascicled, or in 2- or 3-flowered racemes borne on a common rachis up to 5 mm long, the inflorescences puberulent, the pedicels slender, 5 to 6 mm long, the bracts oblong-ovate, acuminate, 1 to 2 mm long, the bracteoles similar but smaller. Calyx lobes ovate, obtuse to rounded, about 1 mm long, obscurely puberulent, becoming glabrous. Petals oblong-elliptic, rounded, 4 mm long, 2 to 2.2 mm wide. Filaments thickened below, 4 mm long; anthers ovoid, 1 mm long.

Luzon, Rizal Province, Bantol, *Loher* 14144 (type), 14255, February and March.

Additional material may show that this is scarcely other than a large-leaved variety of *Ilex buergeri* Miq. It differs from the Benguet material representing the variety *rolfei* of Miquel's species in numerous details.

CELASTRACEÆ

Genus KOKOONIA Thwaites

Kokoonia luzoniensis sp. nov.

Arbor glabra; foliis oppositis, coriaceis, integris, ellipticis ad oblongo-ellipticis, basi acutis, apice rotundatis ad breviter obtuse acuminatis, in siccitate pallidis, 6 ad 8 cm longis, nervis utrinque 4 vel 5, adscendentibus; inflorescentiis axillaribus, pedunculatis, laxis, paniculatis, foliis aequantibus vel longioribus; floribus 3.5 mm longis, sepalis 5, ovatis, obtusis ad acutis, circiter 1 mm longis, obscure laciniato-ciliatis; petalis 5, oblongo-spatulatis, obtusis, basi cuneatis; antheris 3, sessilibus, 0.4 mm longis; ovario 3-loculare, loculis 6-ovulatis, ovulis axillaribus, biseriatis, adscendentibus.

A glabrous tree, the branches and branchlets terete. Leaves opposite, coriaceous, pale when dry, elliptic to oblong-elliptic, entire, 6 to 8 cm long, 2.5 to 5 cm wide, base acute, apex rounded to shortly and obtusely acuminate; lateral nerves 4 or 5 on each side of the midrib, ascending, not prominent, the reticulations lax, obscure; petioles 5 to 8 mm long. Inflorescences paniculate,

axillary, peduncled, rather slender, many-flowered, equaling or somewhat exceeding the leaves. Flowers yellowish, about 3.5 mm long, pedicelled. Sepals 5, ovate, about 1 mm long, obtuse to acute, their margins obscurely laciniate-ciliate. Petals 5, oblong-spatulate to oblanceolate, rounded, base cuneate, glabrous, about 3.5 mm long, 1 mm wide. Disk fleshy, inclosing the ovary, the 3 stamens inserted on the inner margin of the disk, the anthers sessile or subsessile, subglobose, 0.4 mm long. Ovary 3-celled, ovules 6 in each cell, axile, ascending, arranged in two rows. Style very short. Fruit unknown.

Luzon, Oriud, Loher 13391, May, 1915. The same species is apparently represented by Loher 12754, from Montalban, the specimen with immature flowers.

This species is anomalous in *Kokoonia* through its 3 sessile, minute, subglobose anthers, in its ovary cells being 6-ovulate instead of 4-ovulate, and in its somewhat ciliate-laciniate sepals, but conforms better with the characters of *Kokoonia* than with those of any other described genus. Fruiting material may show that some other generic disposition of it is indicated.

Genus SIPHONODON Griffith

Siphonodon pyriformis Merr. var. *parvifolius* var. nov.

A typo differt foliis minoribus, 4 ad 5 cm longis.

Luzon, Rizal Province, Balacbac, Montalban, Loher 12809, March, 1909, altitude about 800 meters.

The specimen is in fruit, and the fruit presents the characteristics of the species.

STAPHYLEACEÆ

Genus TURPINIA Ventenant

Turpinia pachyphylla sp. nov.

Arbor glabra, ramulis teretibus, circiter 8 mm diametro; foliis plerumque 5-foliolatis, circiter 25 cm longis, foliolis ellipticis, crasse coriaceis, acuminatis, minute glanduloso-crenulatis, 12 ad 15 cm longis, nervis utrinque circiter 6, curvato-adscendentibus, perspicuis; inflorescentiis axillaribus, pedunculatis, usque ad 25 cm longis, multifloris; floribus 4.5 mm longis, sepalis petalisque ad margine obscure ciliatis, sepalis elliptico-ovatis, rotundatis, 4 mm longis, petalis oblongo-ellipticis, rotundatis, quam sepalis paullo angustioribus; filamentis crassis, glabris, 2.5 mm longis; stylis connatis; ovario 3-loculare, ovulis 6, biseriatis.

A glabrous tree, the branchlets terete, smooth, brown when dry, about 8 mm in diameter. Leaves mostly 5-foliolate, about 25 cm long, the leaflets elliptic, thickly coriaceous, distinctly acuminate, base broadly acute to rounded, margins rather obscurely glandular-crenulate, the upper surface brownish oliveaceous, the lower somewhat pale, slightly shining; lateral nerves about 6 on each side of the midrib, prominent, curved-ascending, the reticulations distinct; petiolules stout, 10 to 14 mm long. Inflorescences axillary, peduncled, equaling the leaves, stout, many-flowered, the nodes supplied with greatly reduced simple leaves. Flowers about 4.5 mm long, the sepals coriaceous, elliptic-ovate, rounded, 4 mm long, margins obscurely ciliate. Petals equaling the sepals, somewhat thinner, slightly narrower, margins slightly ciliate, apex rounded. Filaments stout, glabrous, 2.5 mm long. Styles entirely united, stout. Ovary 3-celled, each cell with 6 ovules, the ovules 2-seriate.

Luzon, Rizal Province, Mabiluang, Loher 14463, October, 1913.

With a very broad interpretation of *Turpinia pomifera* DC., this form would be included in that species. The characters, however, would seem to indicate that it should be distinguished from that collective species. The stout branchlets, thick leaflets, many-flowered inflorescences, and distinctly large flowers are characteristic.

Turpinia simplicifolia sp. nov.

Arbor glabra, ramis ramulisque teretibus, tenuibus; foliis stricte 1-foliolatis, chartaceis, oblongis ad oblongo-ellipticis, 10 ad 15 cm longis, tenuiter acuminatis, basi acutis, integris, nervis utrinque circiter 12, tenuibus, distinctis; inflorescentiis tenuibus, laxis, pedunculatis, paniculatis, foliis aequantibus vel longioribus; floribus circiter 3 mm longis, sepalis glabris, petalis ad margine obscure ciliatis, rotundatis; ovario 3-loculare, loculis biovulatis.

A glabrous tree, the branches and branchlets slender, terete, reddish brown, the ultimate branchlets about 1.5 mm in diameter. Leaves simple, chartaceous, pale and somewhat shining when dry, oblong to oblong-elliptic, 10 to 15 cm long, 3.5 to 5.5 cm wide, entire, narrowed below to the acute base and above to the slenderly acuminate apex; lateral nerves about 12 on each side of the midrib, slender, distinct, anastomosing, the

reticulations rather close, evident on both surfaces; petioles slender, 1.5 to 2.5 cm long. Inflorescences axillary, peduncled, slender, lax, equaling or somewhat exceeding the leaves. Flowers about 3 mm long, the sepals elliptic, rounded, about 2.5 mm long, glabrous, the petals similar to the sepals but somewhat thinner and slightly ciliate on their margins. Filaments 2 mm long. Ovary glabrous, 3-celled, cells 2-ovuled, the styles entirely united, up to 3 mm long.

LUZON, Rizal Province, Montalban and Balacbac, *Loher 12756, 12772, 12992* (type).

A very distinct species not at all closely allied to any previously described form, strongly characterized by its strictly simple, slenderly acuminate, many-nerved leaves and slender inflorescences.

SAPINDACEÆ

Genus HARPULLIA Roxburgh

Harpullia arborea (Blanco) Radlk. var. *megalocarpa* var. nov.

A typo differt fructibus multo majoribus, usque ad 5 cm longis et 9 cm latis, seminibus ellipsoideis, 2 cm longis.

LUZON, Rizal Province, Mount Sumag, Montalban, *Loher 13273*, April, 1912.

The specimens present no character by which they may be distinguished from the typical form of the species other than the very large fruits. These appear to be normal, for one contains a mature ellipsoid seed 2 cm in length.

RHAMNACEÆ

Genus SAGERETIA Brongniart

Sageretia hamosa Brongn.

Sageretia hamosa BRONGNIART in Ann. Sci. Nat. 10 (1826) 360;
SCHNEIDER in Sargent Pl. Wils. 2 (1914) 230.

LUZON, Tayabas Province, Umirey region, *Loher 14009*, June, 1914.

The specimen agrees very closely with the published descriptions and undoubtedly represents Brongniart's species, although the petals are entirely glabrous. Previously recorded from India, Ceylon, Java, and Formosa.

DILLENIACEÆ

Genus SAURAUIA Willdenow

Sauraia loheri sp. nov.

Arbor parva, ramulis inflorescentiisque perspicue longe ciliato-setosis; foliis oblongo-lanceolatis, 9 ad 16 cm longis, 2.5 ad 4.5 cm latis, chartaceis, supra atro-olivaceis, subtus brunneis, tenuiter caudato-acuminatis, basi acutis ad subrotundatis, margine serratis, dentibus longe setosis, nervis utrinque circiter 15, perspicuis; inflorescentiis axillaribus, pedunculatis, cymosis, plerumque paucifloris, bracteatis, bracteis ovatis ad lanceolatis, 8 ad 12 mm longis, acuminatis, longe setosis; sepalis late ovatis, subacute ad obtusis, 5 ad 6 mm longis, extus longe setosis, setae 3 ad 5 mm longae; petalis circiter 8 mm longis, inaequilateraliter retusis, glabris; staminibus 20, filamentis antherisque 3 mm longis; ovario pubescente, stylis 5, liberis, 3.5 mm longis.

A small tree, the branchlets, petioles, inflorescences, and the midrib on the lower surface of the leaves conspicuously setose-ciliate with slender, spreading, brownish hairs, 2 to 5 mm in length, the older branches glabrous, pale brown. Leaves oblong-lanceolate, chartaceous, 9 to 16 cm long, 2.5 to 4.5 cm wide, narrowed above to the slenderly caudate-acuminate apex, the base acute to somewhat rounded, margins serrate, the teeth tipped with long setæ, the upper surface atro-olivaceous, glabrous except for a few long setæ on the midrib, the lower surface brown, long-setose on the midrib and lateral nerves; primary nerves about 15 on each side of the midrib, prominent on the lower surface; petioles long-setose, 1 to 1.8 cm long. Cymes axillary, peduncled, mostly few-flowered, about 3 cm long, the bracts foliaceous, setose, ovate to lanceolate, acuminate, 8 to 12 mm long. Flowers about 1.8 cm in diameter, the sepals broadly ovate, 5 to 6 mm long, subacute to obtuse, the exterior ones densely long-setose in all parts, the interior ones setose only in the median parts. Petals somewhat obovate-oblong, inequilaterally retuse, about 8 mm long, 4 mm wide. Stamens 20, the filaments and anthers 3 mm long. Ovary pubescent; styles 5, glabrous, free to the base, about 3.5 mm long.

Luzon, Rizal Province, Montalban and Mount Sumag, *Loher 12073, 12300* (type), 12666, April, May, and October.

A species strongly characterized by its numerous, long, spreading setæ, in some respects resembling *Sauraia clementis* Merr., but with very differently shaped, more numerously nerved leaves, pubescent ovaries, and 5 free styles, not 3 somewhat

united ones. There are numerous other points of difference between the two species.

GUTTIFERÆ

Genus GARCINIA Linnæus

Garcinia loheri sp. nov.

Arbor parva, glabra, ramis ramulisque teretibus, ramulis circiter 1 mm diametro; foliis parvis, pallidis vel olivaceis, ellipticis ad oblongo-ellipticis, 3.5 ad 6 cm longis, obtusis ad rotundatis, basi acutis, margine leviter recurvatis, nervis utrinque 15 ad 20, tenuibus, nervillis destitutis; floribus & axillaribus, sessilibus, solitariis vel fasciculatis, 4-meris, sepalis orbicularis vel reniformibus, circiter 1.3 mm longis; antheris 5, sessilibus, erectis, distinctis, rimis longitudinaliter dehiscentibus, 1.2 mm longis; fructibus subglobosis, circiter 2 cm diametro, 6-locellatis, in siccitate plus minusve angulatis.

A small glabrous tree, the branches and branchlets terete, the branchlets slender, about 1 mm in diameter, internodes usually short. Leaves chartaceous to subcoriaceous, elliptic to oblong-elliptic, 3.5 to 6 cm long, 2 to 3 cm wide, apex rounded to obtuse, base acute, margins usually slightly recurved, pale or olivaceous when dry; lateral nerves 15 to 20 on each side of the midrib, slender, anastomosing with the equally slender submarginal nerve near the edge of the leaf, the reticulations indistinct; petioles about 5 mm long. Male flowers solitary or fascicled, 4-merous, axillary, sessile, the buds globose, 2 to 3 mm in diameter. Sepals orbicular to reniform, about 1.3 mm long, the petals similar to the sepals. Rudimentary ovary none. Stamens 5, sessile, erect, the anthers free, 0.5 mm long, dehiscing longitudinally. Fruit subglobose, about 2 cm in diameter, 6-celled, when dry somewhat angled.

LUZON, Rizal Province, Montalban and Oriud, Loher 12339, 12880, 14077 (type), flowering in April and March, fruiting in October.

A species belonging in the same group with *Garcinia rubra* Merr., but with very different floral and leaf characters.

FLACOURTIACEÆ

Genus HOMALIUM Jacquin

Homalium obovatum sp. nov. § *Blackwellia*.

Arbor, inflorescentiis exceptis glabra; foliis obovatis, integris, nitidis, subcoriaceis, 5 ad 7 cm longis, basi acutis, apice pler-

umque late rotundatis, nervis primariis utrinque circiter 7, distinctis; paniculis axillaribus, foliis aequantibus vel multo longioribus, usque ad 12 cm longis, perspicue ciliatis; floribus 7- vel 8-meris, sepalis ciliatis, linear-lanceolatis, acutis vel acuminatis, 3 mm longis; petalis oblanceolatis, obtusis, ciliatis, quam sepalis duplo latioribus; antheris 7 vel 8, filamentis ciliatis; stylis 4, ciliatis, tenuibus, 2 mm longis, subpatulis.

A tree, entirely glabrous except the conspicuously cinereous-ciliate inflorescences, the branches terete, grayish, branchlets usually reddish brown. Leaves obovate, entire, glabrous, shining, olivaceous, paler beneath, 5 to 7 cm long, 3 to 5 cm wide, base acute, apex usually broadly rounded, sometimes shortly and broadly obtuse-acuminate; primary lateral nerves about 7 on each side of the midrib, distinct, arched-anastomosing, the reticulations distinct; petioles 3 to 8 mm long. Inflorescences paniculate, axillary, peduncled, equaling or longer than the leaves, sometimes attaining a length of 12 cm, prominently ciliate, the indumentum cinereous. Flowers 7- or 8-merous, numerous, white, about 7 mm in diameter, the perianth tube subcylindric, somewhat narrowed below, sulcate, ciliate, 2 to 2.5 mm long. Sepals and petals cinereous-ciliate, about 3 mm long, the former narrowly linear-lanceolate, acute, the latter oblong-ob lanceolate, obtuse, base cuneate, twice as wide as the sepals. Stamens one opposite each petal, the filaments ciliate, 3 mm long. Ovary ciliate, the styles 4, about 2 mm long, ciliate, narrowed upward to the slender, somewhat spreading tips.

Luzon, Rizal Province, Montalban (Guinuisan and Lucutan), Loher 12200, 12811, 12871, 14752 (type), flowering in March, July, and September; a medium-sized tree.

A species superficially resembling *Homalium panayanum* F.-Vill., but remote from that species as described by F.-Villar, and as the description is corrected by Vidal, the flowers as to sepals, petals, and stamens being isomericous. Its true alliance is probably with *Homalium subscandens* Elm., which I have apparently erroneously reduced to *Homalium panayanum* F.-Vill.

Homalium polillense sp. nov. § *Myriantheia*.

Arbor, ramulis inflorescentiisque perspicue cinereo-villosis, subtus foliis leviter villosis; foliis ellipticis vel oblongo-ellipticis, 7 ad 9 cm longis, breviter acuminatis, subcoriaceis, olivaceis, crenato-serratis, nervis utrinque circiter 6, subtus valde perspicuis; inflorescentiis paniculatis, ramis paucis, elongatis; floribus 7-

meris, circiter 10 mm diametro, haud fasciculatis, sepalis petalisque perspicue ciliatis, oblanceolatis, 3.5 ad 4.5 mm longis, acutis, circiter 0.6 mm latis; staminibus 21, filamentis 2.5 mm longis, deorsum ciliatis; stylis 6, villosis, tenuis, deorsum ciliatis, 2 mm longis; bracteolis lanceolatis, acuminatis, 2.5 mm longis.

A tree, the branchlets and inflorescences conspicuously cinereous-ciliate, the branches terete, glabrous, grayish. Leaves elliptic to oblong-elliptic, subcoriaceous, olivaceous, 7 to 9 cm long, 3.5 to 4.5 cm wide, base acute, apex shortly and bluntly acuminate, margins crenate-serrate, the teeth in younger leaves tipped beneath with a tuft of short hairs, the upper surface glabrous except for the more or less pubescent midrib, the lower surface sparingly and softly villous; lateral nerves about 6 on each side of the midrib, very prominent on the lower surface, anastomosing, the reticulations not prominent; petioles villous, about 4 mm long. Panicles in the upper axils, up to 15 cm long, the branches few, elongated, up to 10 cm long. Flowers numerous, racemously arranged, solitary at the nodes of the branches, 7-merous, about 10 mm in diameter, the subtending bracteoles lanceolate, ciliate, acuminate, 2.5 mm long, the pedicels about 2 mm long. Sepals and petals similar, equal, ciliate, oblanceolate, acute, about 0.6 mm wide, 3.5 to 4.5 mm long, the perianth tube ciliate, sulcate, narrowed below, about 3 mm long. Stamens 3 opposite each petal, the filaments 2.5 mm long, ciliate below. Styles 6, ciliate below, slender, 2 mm long.

POLILLO, Loher 14535, May, 1908.

A species greatly resembling and manifestly closely allied to *Homalium villosum* Merr., differing in its larger flowers, longer sepals and petals, longer styles, and its lanceolate, acuminate bracteoles.

MYRTACEÆ

Genus EUGENIA Linnæus

Eugenia diospyrifolia sp. nov. § *Eueugenia*.

Arbor parva, ramulis et subtus foliis junioribus plus minusve ferrugineo-villosis, vetustioribus glabrescentibus; foliis subcoriaceis, oblongis ad oblongo-lanceolatis, 12 ad 17 cm longis, 3 ad 5 cm latis, petiolatis, in siccitate pallidis vel brunneis, utrinque subaequaliter angustatis, basi acutis, apice obtuse acuminatis, nervis utrinque circiter 10, tenuibus, obscuris, aliquando obsoletis vel subobsoletis; floribus parvis, axillaribus, sessilibus, solitariis vel depauperato fasciculatis, 4-meris, pubescentibus; fructibus globosis, glabris, 2 cm diametro.

A small tree, the younger parts distinctly ferruginous-villous, in age becoming glabrous or subglabrous. Branches and branchlets pale or brownish, terete, the former glabrous, the latter usually villous. Leaves subcoriaceous, oblong to oblong-lanceolate, 12 to 17 cm long, 3 to 5 cm wide, usually brown when dry, sometimes pale, the younger ones distinctly villous on the lower surface, sometimes on both surfaces, becoming glabrous or nearly so at maturity, subequally narrowed to the acute base and to the blunt-acuminate apex; lateral nerves slender, obscure, often obsolete or nearly so, when evident about 10 on each side of the midrib, reticulations obsolete; petioles 5 to 12 mm long, prominently channeled on the upper surface, usually pubescent. Flowers axillary, solitary or in few-flowered fascicles, sessile, pubescent, 4-merous, the buds obovoid, about 4 mm in diameter. Calyx pubescent, the lobes 2.5 to 3 mm long, ovate, subacute. Petals obovate, 3 mm long, their margins ciliate. Stamens numerous, the filaments short. Fruit globose, glabrous, about 2 cm in diameter, 1-seeded.

Luzon, Rizal Province, Montalban, Loher 13307 (type), 13328, 14879, May and July, 1913 and 1915.

A distinct species of the section *Eueugenia* probably most closely allied to *Eugenia sargentii* Merr., but remote from that species.

Eugenia cordatilimba sp. nov. § *Jambosa*.

Arbor glabra, ramulis teretibus; foliis oppositis, sessilibus, oblongis ad oblongo-ellipticis, coriaceis, acutis, basi latè rotundatis, cordatisque, subamplexicaulis, 20 ad 25 cm longis, 7 ad 9 cm latis, in siccitate pallidis, opacis, nervis utrinque circiter 20, distinctis, patulis, anastomosantibus; inflorescentiis terminalibus, subcorymbosis, 7 ad 10 cm longis, 10 ad 15 cm latis, e basi ramosis, multifloris; floribus purpureis, plerumque solitariis, in ramulis ultimis dispositis, pedicellatis, distincte 2-bracteolatis, 2 ad 2.5 cm longis, calycis infundibuliformibus, circiter 1 cm longis, deorsum angustatis, inaequaliter 4-lobatis, lobis late reniformibus, circiter 5 mm latis; petalis ovatis, glandulosis, liberis, circiter 6 mm longis; filamentis numerosis, 7 ad 14 mm longis.

A glabrous tree, the branches and branchlets terete, brownish, usually smooth, the ultimate branchlets about 7 mm in diameter. Leaves opposite, sessile, oblong to oblong-elliptic, coriaceous, acute, base broadly rounded, cordate, subamplexicaul, coriaceous, pale when dry, dull, 20 to 25 cm long, 7 to 9 cm wide; lateral

nerves about 20, distinct, spreading, somewhat curved, anastomosing with the nearly equally distinct marginal nerve 5 to 10 mm from the edge of the leaf, reticulations lax, slender, not prominent. Inflorescences terminal, subcorymbose, 7 to 10 cm long, 10 to 15 cm wide, many-flowered, branched from the base, the flowers purplish, all distinctly pedicelled, solitary, each ultimate branch usually bearing 3 flowers, the subtending bracteoles 2, deciduous, the pedicels up to 5 mm long. Calyx funnel-shaped, terete, about 1 cm long, narrowed below to the cuneate base, the limb of 4 broadly reniform lobes, the lobes up to 5 mm wide. Petals conspicuously glandular, ovate, about 6 mm long. Stamens indefinite, their filaments 7 to 14 mm long.

Luzon, Rizal Province, Balintingan, Loher 12830, 14924 (type), March, 1909, and July, 1913; a medium-sized tree.

According to Robinson's arrangement of the Philippine species, this falls in the group with *Eugenia subrotundifolia* C. B. Rob., but it is not at all closely allied to any of the species placed here. It is strongly characterized by its oblong, acute, sessile, broadly rounded and cordate, subamplexicaul leaves, and its terminal, many-flowered inflorescences, which are branched from the base.

Eugenia crassilimba sp. nov. § *Jambosa*.

Arbor glabra, ramis ramulisque teretibus; foliis crasse coriaceis, sessilibus, lanceolatis, 20 ad 30 cm longis, 3 ad 5 cm latis, basi abrupte rotundatis cordatisque, subamplexicaulis, sursum gradatim angustatis, acutis vel acuminate, margine plerumque incrassatis recurvatisque, nervis utrinque 15 ad 20, distantibus, distinctis, anastomosantibus; inflorescentiis terminalibus, paucifloris, subcorymbosis, 5 ad 10 cm longis, breviter pedunculatis, ramis paucis, floribus plerumque in triadibus dispositis, obscure bibracteolatis, purpureis, circiter 4 cm diametro; calycis infundibuliformibus circiter 2.5 cm longis, lobis 4, subreniformibus, circiter 1 cm latis; petalis orbiculari-ovatis, liberis, circiter 1.2 cm diametro; filamentis numerosis, circiter 1.5 cm longis.

A glabrous tree, the branches and branchlets terete, pale brownish or grayish, usually smooth, the ultimate branchlets 2 to 3 mm in diameter. Leaves thickly coriaceous, opposite, sessile, lanceolate, 20 to 30 cm long, 3 to 5 cm wide, the base abruptly and broadly rounded, distinctly cordate and subamplexicaul, gradually narrowed upward to the acute or somewhat acuminate apex, the margins usually thickened and recurved, when dry usually pale brownish, shining; lateral nerves 15 to 20

on each side of the midrib, distant, irregular, spreading, distinct, anastomosing directly with the equally prominent submarginal nerves which are only slightly arched. Inflorescences terminal, subcorymbose, few-flowered, 5 to 10 cm long, the rather large flowers mostly in threes at the tips of the branches, mostly shortly pedicellate, the subtending pair of bracteoles obscure. Flowers purplish, about 4 cm in diameter, the calyces terete, funnel-shaped, about 2 cm in diameter, narrowed below into a short pseudostalk, the lobes 4, subreniform, about 1 cm wide. Petals 4, free, orbicular-ovate, about 12 mm in diameter. Stamens indefinite, about 2 cm long.

Luzon, Rizal Province, Paningtingan, Loher 14208, February, 1913.

A species well characterized by its thickly coriaceous, lanceolate, elongate, sessile, cordate, subamplexicaul leaves, their margins usually revolute, its short terminal inflorescences, and its relatively large flowers. It probably belongs in the general group with *Eugenia merrillii* C. B. Rob.

Eugenia megalophylla sp. nov. § *Syzygium*.

Arbor glabra, ramulis crassis, circiter 2 cm diametro, teretibus, laevis; foliis permagnis, circiter 50 cm longis et latis, late ovatis vel suborbiculari-ovatis, coriaceis, in siccitate purpureo-brunneis utrinque concoloribus, nitidis, sessilibus, basi latissime rotundatus, obscure subcordatis, apice breviter abrupte acuminatis, nervis utrinque 20 ad 25, valde perspicuis, anastomosantibus; inflorescentiis terminalibus, pedunculatis, usque ad 30 cm longis, pyramidatis, ramis inferioribus usque ad 15 cm longis, patulis; floribus in triadibus dispositis, brevissime pedicellatis, bibracteolatis, calycis teretibus, circiter 11 mm longis, truncatis, apice circiter 5 mm diametro, deorsum angustatis; petalis calypratim deciduis, calytra 5 mm diametro; filamentis numerosis, 4 ad 11 mm longis.

A grabrous tree, the branchlets thick, terete, smooth, about 2 cm in diameter, pale brownish when dry. Leaves broadly ovate to suborbicular-ovate, about 50 cm long and wide, coriaceous, brownish purple and shining on both surfaces when dry, sessile, the base very broadly rounded, shallowly and obscurely subcordate, the apex abruptly short-acuminate; lateral nerves 20 to 25 on each side of the midrib, very prominent on both surfaces, somewhat curved, anastomosing with the distinct submarginal nerve 5 to 10 mm from the edge of the leaf, the primary reticulations subparallel, lax, distinct. Panicles terminal, pyram-

idal, up to 30 cm long and wide, the peduncle about 10 cm long, terete, nearly 1 cm in diameter, the ultimate branchlets obscurely angled. Flowers white, borne in triads at the tips of the ultimate branchlets, bibracteolate, the pedicels stout, very short (1 to 2 mm long), the calyces about 11 mm long, terete, truncate, the mouth about 5 mm in diameter, gradually narrowed below into a pseudostalk. Petals united into a deciduous calyptra 5 mm in diameter. Stamens numerous, their filaments 4 to 11 mm long.

Luzon, Tayabas Province, Umirey region, Loher 13596, May, 1915.

A remarkable species on account of its enormous leaves, not closely related to any previously described form.

ERICACEÆ

Genus VACCINIUM Linnæus

Vaccinium rizalense sp. nov.

Arbor parva, inflorescentiis exceptis glabra; foliis crasse coriaceis, ellipticis ad oblongo-ellipticis, 6 ad 9 cm longis, breviter acuminatis, basi acutis, in siccitate supra olivaceis vel pallide olivaceis, subitus brunneis, nervis utrinque 2 vel 3, tenuibus, adscendentibus; racemis axillaribus, leviter pubescentibus, solitariis vel fasciculatis, 4 ad 8 cm longis, bracteis subpersistib; oblongis, subacuteis, leviter pubescentibus, 8 mm longis; floribus ovoideis, 5 mm longis, extus leviter adpresso pubescentibus, corolla sursum contracta, lobis ovatis, reflexis, 1 mm longis; filamentis 1.5 mm longis, leviter ciliatis, antheris oblongis, apice breviter productis, filamentis subaequantibus; ovario pubescente, stylis cylindricis, glabris, 4 mm longis.

A tree, glabrous except the sparingly pubescent inflorescences, the branches rugose, dark reddish brown. Leaves thickly coriaceous, elliptic to oblong-elliptic, 6 to 9 cm long, 3 to 4.5 cm wide, the apex shortly and bluntly acuminate, the base acute, margins somewhat reflexed, the upper surface olivaceous or pale olivaceous when dry, the lower surface brown, somewhat glandular-punctate; lateral nerves 2 or 3 on each side of the midrib, slender, ascending, reticulations obscure; petioles stout, 1 cm long or less. Racemes axillary, solitary or fascicled, 4 to 8 cm long, many-flowered, slightly appressed-pubescent, the bracts oblong, subpersistent, about 8 mm long, 3.5 mm wide, acute or slightly acuminate, the bracteoles acuminate, 2 mm long. Flowers purple, externally slightly appressed-pubescent, 5 mm long, their pedicels 2.5 to 4 mm long. Calyx somewhat pubescent, the tube

very short, the lobes triangular, acute, 1.2 mm long. Corolla ovoid, inflated below and nearly 3 mm in diameter, contracted above and 1 to 1.2 mm in diameter at the apex, the lobes broadly ovate, subacute, reflexed, 1 mm long. Filaments thickened below, somewhat pubescent, 1.5 mm long, the anthers oblong, equaling the filaments, slightly produced at their apices. Ovary pubescent; style cylindric, glabrous, 4 mm long.

Luzon, Rizal Province, Guinuisan and Balacbac, Loher 12150, 14979 (type), June and July, 1909 and 1912.

A species closely allied to *Vaccinium platyphyllum* Merr., differing in its much smaller leaves.

Genus DIPLYCOSIA Blume

Diplycosia loheri sp. nov.

Frutex ut videtur scandens, ramulis et pedicellis et calycis perspicue patule ciliato-setosis; foliis elliptico-ovatis, subcoriaceis, obscurissime nervosis, 2.5 ad 4 cm longis, acuminatis, basi obtusis ad subrotundatis, utrinque margineque parce setoso-ciliatis; floribus axillaribus, solitariis vel binis, rarer trinis, tenuiter pedicellatis, pedicellis 1 ad 2.5 cm longis; corolla turbinata, glabra, 5.5 mm longa, lobis late ovatis, reflexis, 1.5 mm longis; filamentis glabris, 2 ad 2.5 mm longis, antheris circiter 1.4 mm longis, apice breviter productis.

A shrub, apparently scandent, the branchlets, pedicels, and calyces conspicuously ciliate-setose with numerous, reddish brown, spreading hairs 0.5 to 3 mm long, similar but more-scattered hairs on both surfaces of the leaves and on their margins. Branches glabrous, dark when dry, the branchlets paler, the ultimate ones 1 to 1.5 mm in diameter. Leaves subcoriaceous, elliptic-ovate, somewhat acuminate, base obtuse to rounded, oliveaceous on the upper surface when dry, paler beneath, 2.5 to 4 cm long, 1.5 to 2.5 cm wide, the nerves obscure, frequently only a subbasal pair, never more than two pairs, evanescent, reticulations obsolete; petioles ciliate-setose, 2 to 3 mm long. Flowers axillary, solitary or in pairs or threes, their slender, conspicuously ciliate-setose, slender pedicels 1 to 2.5 cm long. Calyces densely and conspicuously ciliate-setose, the tube about 3 mm long, the lobes triangular, acute, less than 1 mm long. Corolla glabrous, somewhat turbinated, 5.5 mm long, the lobes recurved, broadly ovate, obtuse, 1.5 mm long. Filaments glabrous, 1.5 to 2 mm long, the anthers about 1.4 mm long, their apices somewhat produced.

Luzon, Nueva Vizcaya Province, Caraballo Mountains, Loher
13693, March, 1915.

A remarkably distinct species, distinguished among all hitherto known Philippine forms by its conspicuously ciliate-setose calyces, the setæ being reddish brown, spreading, 0.5 to 2.5 mm in length, similar to those on the long slender pedicels, the branchlets, petioles, and leaves. The scattered setose hairs on the lower surface of the leaves spring from small dark-colored glands, these glands persisting after the setæ fall.

MYRSINACEÆ

Genus EMBELIA Burman f.

Embelia loheri sp. nov. § *Pattara*.

Frutex scandens, inflorescentiis exceptis glaber, ramis ramulisque tenuibus, foliis chartaceis, lanceolatis, usque ad 9 cm longis et 2.5 cm latis, haud glandulosis, tenuiter acuminatis, basi acutis, margine perspicue serratis, nervis primariis utrinque 8 ad 10, distinctis, anastomosantibus; racemis axillaribus, solitariis, 3 ad 7 cm longis, breviter pubescentibus; floribus circiter 4 mm diametro, sepalis oblongo-ovatis, 1 mm longis, leviter pubescentibus, subacute, partibus superioribus parce glandulosis; petalis ellipticis, symmetricis, liberis, 2 mm longis, extus glabris, intus puberulis, rotundatis, partibus superioribus perspicue glandulosis; filamentis petalis aequilongis, antheris 0.5 mm longis, obtusis, connectivo glanduloso.

A scandent shrub, glabrous except the papillose-pubescent inflorescences. Branches and branchlets slender, pale, terete. Leaves lanceolate, brownish olivaceous, paler and usually brown beneath, chartaceous, 4 to 9 cm long, 1.5 to 2.5 cm wide, narrowed above to the rather slenderly acuminate apex and below to the acute base, the margins especially in the upper two-thirds or three-fourths conspicuously serrate, the teeth rather distant, acuminate; lateral nerves 8 to 10 on each side of the midrib, distinct, anastomosing, the reticulations distinct; petioles about 4 mm long. Racemes solitary, in the axils of normal leaves, 3 to 7 cm long, papillose-pubescent with short hairs, many-flowered. Flowers reddish, 4 mm in diameter, their pedicels slender, 5 mm long, papillose-pubescent, the bracteoles lanceolate, acuminate, 1 to 1.2 mm long, pubescent, glandular. Calyx 2 mm in diameter, the lobes oblong-ovate, 1 mm long, subacute, slightly pubescent, with scattered conspicuous glands in the upper half. Petals

free, symmetric, elliptic, rounded, glabrous externally, puberulent inside, 2 mm long, with scattered conspicuous glands in the upper half. Stamens as long as the petals, the anthers ovoid, obtuse, 0.5 mm long, connectives glandular. Ovary and style glabrous, 1 mm long.

LUZON, Rizal Province, Paningtingan and Oriud, *Loher 13162, 13845* (type), March, 1912 and 1914.

A species belonging in the group with *Embelia tsjeriam-cottam* A. DC., its closest ally among the known Philippine forms being *Embelia luzoniensis* Merr., from which it is distinguished by its lanceolate, sharply toothed leaves and its much longer racemes.

SAPOTACEÆ

Genus PALAQUIUM Blanco

Palaquium elliptilimbum sp. nov.

Arbor, novellis, pedicellis, calycis, et foliis junioribus subtus minutissime adpresso pubescentibus, foliis vetustioribus utrinque glaberrimis; foliis ellipticis, coriaceis, 6 ad 9 cm longis, 3.5 ad 5.5 cm latis, brunneo-olivaceis, brevissime obtuseque acuminatis, basi acutis vel decurrento-acuminatis, nervis utrinque circiter 8, distinctis, reticulis obsoletis vel subobsoletis, petiolo 1.5 ad 3 cm longo; floribus numerosis, fasciculatis, plerumque in axillis defoliatis, sepals ovatis, coriaceis, obtusis vel rotundatis, circiter 3 mm longis; staminibus 12; ovario 6-loculare.

A tree, the very young parts, pedicels, calyces, and the lower surfaces of younger leaves densely and minutely pubescent with golden brown, appressed hairs, the older leaves entirely glabrous. Branches pale brownish, rugose, the ultimate branchlets about 2 mm in diameter, nearly glabrous. Leaves coriaceous, elliptic, 6 to 9 cm long, 3.5 to 5.5 cm wide, shortly and obtusely acuminate, base acute or decurrent-acuminate, brownish or olivaceous when dry, rather dull; lateral nerves about 8 on each side of the midrib, slender, distinct, the reticulations obsolete or nearly so; petioles 1.5 to 3 cm long. Flowers very numerous, fascicled on the branches below the leaves, few in the leaf axils on the ultimate branchlets, their pedicels rather slender, appressed-pubescent, about 2.5 cm long. Sepals coriaceous, ovate to broadly ovate, rounded to obtuse, minutely appressed-pubescent on the back, the outer three thicker than the inner ones, the latter usually with glabrous margins. Corolla tube glabrous, cylindric, 3 mm long, the lobes reflexed in anthesis, oblong-elliptic, about

6 mm long, 2.8 mm wide, acute. Stamens 12, their filaments 3 mm long, glabrous, the anthers oblong-ovate, prominently apiculate-acuminate, 3 to 4 mm long. Ovary 6-celled; style 11 mm long.

Luzon, Rizal Province, Montalban, Loher 12170, 13867 (type), in full anthesis in January.

A species resembling *Palaquium glabrum* Merr. in many respects, but with 12 instead of 18 stamens, pubescent in many parts, and with smaller and fewer-nerved leaves.

Palaquium loheri sp. nov.

Arbor, ramulis junioribus, pedicellis, calycis, et subtus foliis praesertim ad costa perspicue castaneo-tomentosis; foliis subcoriaceis, oblongo-obovatis, 8 ad 13 cm longis, obtusis ad breviter obtuse acuminatis, deorsum angustatis, basi cuneatis, nervis utrinque circiter 8, distinctis; floribus numerosis, fasciculatis, plerumque e axillis defoliatis, pedicellis 1.5 ad 2 cm longis; sepalis exterioribus extus dense castaneo-tomentosis, late ovatis, subacute, 3 mm longis, interioribus suborbicularis, rotundatis; corollae tubo circiter 2 mm longo, lobis oblongo-ovatis, 5 ad 6 mm longis, glabris, obtusis; staminibus 12, filamentis 3 mm longis, antheris oblongo-ovatis, apiculatis, 2 mm longis; ovario glabro, 6-loculare, stylis 12 mm longis.

A tree, the young branchlets, pedicels, calyces, and the midrib on both surfaces of the leaves densely castaneous-tomentose, the branches stout, glabrous, grayish. Leaves oblong-obovate, subcoriaceous, 8 to 13 cm long, 3 to 4.5 cm wide, obtuse to shortly and bluntly acuminate, narrowed below to the cuneate base, the upper surface atro-olivaceous, glabrous except for the tomentose midrib, the lower surface purplish brown, densely tomentose on the midrib, the surface of the lamina sparingly tomentose; lateral nerves about 8 on each side of the midrib, prominent, the reticulations nearly obsolete; petioles about 1.5 cm long, densely tomentose. Flowers numerous, fascicled, chiefly in the axils of fallen leaves, their pedicels 1.5 to 2 cm long, densely castaneous-tomentose, as are the sepals. Outer sepals broadly ovate, subacute, about 3 mm long, the inner ones suborbicular, thinner, less pubescent than the outer ones, rounded. Corolla glabrous, the tube about 2 mm long, the lobes erect or somewhat spreading, possibly ultimately reflexed, oblong-ovate, obtuse, 5 to 6 mm long. Stamens 12, their filaments 3 mm long, the anthers oblong-ovate, apiculate, 2 mm long. Ovary glabrous, 6-celled; style 12 mm long.

Luzon, Rizal Province, Montalban, Loher 12396 (type), 13208, January, 1914.

A species recognizable by its few-nerved, oblong-obovate, obtuse leaves and its castaneous indumentum. Though belonging in the same group with *Palaquium elliptilimbum*, it differs entirely in its vegetative and indumentum characters.

OLEACEÆ

Genus LINOCIERA Swartz

Linociera phanerophlebia sp. nov.

Frutex vel arbor parva, inflorescentiis exceptis glabra, ramis ramulisque teretibus, pallidis vel brunneis; foliis coriaceis, oblongis, 10 ad 14 cm longis, perspicue obtuseque acuminatis, basi acutis, in siccitate pallide olivaceis vel brunneis, nervis utrinque 5 ad 7, subtus valde perspicuis arcuato-anastomosantibus, reticulis laxissimis, obscuris vel obsoletis; inflorescentiis axillaribus, plus minusve cinereo-pubescentibus, multifloris, 3 ad 6 cm longis; floribus sessilibus, plerumque confertis, calycis cupulatis, leviter pubescentibus, 4-lobatis, corollae tubo circiter 1 mm longo, lobis 4, oblongis, obtusis, glabris, margine incurvatis, circiter 4 mm longis.

A shrub or small tree, glabrous except the more or less cinereous-pubescent inflorescences. Branches usually pale, terete, the branchlets reddish brown, slender. Leaves coriaceous, oblong, 10 to 14 cm long, 3.5 to 5 cm wide, the apex conspicuously and obtusely acuminate, base acute, pale olivaceous or brownish when dry; lateral nerves 5 to 7 on each side of the midrib, very prominent on the lower surface, scarcely evident on the upper surface, arched-anastomosing, the reticulations very lax, obscure or obsolete; petioles 6 to 10 mm long. Inflorescences axillary, somewhat cinereous-pubescent, many-flowered, 3 to 6 cm long, branched from or near the base, the flowers crowded, sessile, 4-merous. Calyx cup-shaped, 2.5 mm long, somewhat pubescent, the lobes triangular-ovate, acute or obtuse, 1 mm long. Corolla tube about 1 mm long, the lobes oblong, glabrous, obtuse, about 4 mm long, their margins incurved. Anthers ellipsoid, 1.2 mm long. Ovary ovoid, glabrous, 1.5 mm long, the style very short.

Luzon, Rizal Province, Montalban and Bantol, Loher 12930, 14138, 14220, 14222 (type), February and March, 1913.

A species well characterized by its very conspicuous, few-nerved leaves, the nerves scarcely evident on the upper surface,

strongly projecting and arched-anastomosing on the lower surface, the reticulations lax, faint or obsolete. It belongs in the group with *Linociera coriacea* Vidal, but has much smaller, fewer-nerved leaves.

LOGANIACEÆ

Genus FAGRAEA Thunberg

Fagraea loheri sp. nov.

Frutex glaber, ramulis circiter 3 mm diametro, internodiis brevibus; foliis coriaceis, in siccitate fragilis, brunneis ad atro-olivaceis, plerumque minutissime verruculosis, oblongis ad ellipticis, 6 ad 9 cm longis, acute acuminatis, basi acutis, nervis lateralibus obsoleteis; floribus terminalibus, solitariis, binis vel trinis, circiter 3 cm longis, pedicellis crassis, circiter 8 mm longis; calycis tubo 8 mm diametro, lobus late ovatis, obtusis, circiter 4 mm longis; corollae tubo 11 mm longo, lobis ellipticis, obtusis, 16 mm longis; fructibus in siccitate atris, oblongo-ovoideis, acutis, circiter 3 cm longis.

An entirely glabrous shrub, the branchlets about 3 mm in diameter, the internodes 5 to 10 mm in length. Leaves coriaceous, brittle when dry, brown to dark olivaceous, dull, usually minutely verruculose, oblong to elliptic, 6 to 9 cm long, 2 to 4 cm wide, conspicuously and sharply acuminate, base acute, the lateral nerves obsolete; petioles 1 to 1.8 cm long, rather slender, inflated and clasping at the base. Flowers terminal, solitary, in pairs or in threes, about 3 cm long, the pedicels stout, 8 mm long, somewhat elongated in fruit, the bracteoles ovate, about 2 mm long, obtuse, persistent. Calyx thickly coriaceous, the tube about 8 mm in diameter, 1.5 cm long or less, accrescent in fruit, narrowed below, the lobes broadly ovate, obtuse, about 4 mm long, 6 mm wide at the base. Corolla tube about 11 mm long, the lobes elliptic, obtuse, 16 mm long, 8 mm wide. Filaments about 13 mm long, the oblong-ellipsoid anthers nearly one-half as long. Fruits, when dry, black, oblong-ovoid, acute, about 3 cm long.

LUZON, Rizal Province, Montalban and Mabiluang, *Loher 12056, 12324, 13270, 14464* (type): Nueva Vizcaya Province, Caraballo Mountains, *Loher 13692*, in flower in October, in fruit in March and September.

A species manifestly belonging in the group with *Fagraea obovata* Wall., from which it is distinguished by its much smaller, acutely acuminate leaves and its smaller flowers.

APOCYNACEÆ

Genus **RAUWOLFIA** Linnæus**Rauwolfia loheri** sp. nov.

Frutex vel arbor parva, glabra, ramis teretibus, ramulis le-viter compressis; foliis membranaceis, verticillatis, oblongis ad oblongo-lanceolatis, usque ad 20 cm longis et 4 cm latis, basi acutis, apice acutis vel breviter acuminatis, in siccitate supra olivaceis, subtus pallidis, nervis utrinque circiter 18, distinctis; cymis terminalibus, pedunculatis, circiter 10 cm longis, pauci-floris, calycis lobis lanceolatis, acuminatis, 1.5 ad 2.5 mm longis, corollae tubo 1 cm longo, lobis saltem 4 mm longis; fructibus circiter 1 cm longis, oblongo-ellipticis.

A glabrous shrub or small tree, the branches terete, pale brownish, shining, smooth, not lenticellate, the branchlets slender, slightly compressed, 1.5 to 2 mm in diameter, olivaceous. Leaves verticillate, mostly in threes, membranaceous, oblong, 10 to 20 cm long, 2.5 to 4 cm wide, subequally narrowed to the acute base and to the acute or slightly acuminate apex, the upper surface olivaceous, the lower surface pale, smooth; lateral nerves about 18 on each side of the midrib, slender, prominent, anastomosing, the reticulations lax, distinct; petioles 1 to 1.3 cm long. Inflorescences terminal, peduncled, slender, about 10 cm long, cymose, the flowers somewhat fascicled on the ultimate branches, their pedicels about 6 mm long. Calyx lobes lanceolate, acuminate, 1.5 to 2.5 mm long. Corolla tube about 1 cm long, inflated in the middle, slender, glabrous externally, the throat bearded, the lobes oblong, at least 4 mm long. Anthers 1.5 mm long. Disk cylindric, truncate, about 1 mm in diameter, 0.6 mm high. Fruit oblong-ellipsoid, obtuse, about 1 cm long, somewhat rugose when dry.

LUZON, Rizal Province, Montalban, Loher 12500, June, 1909, flowers pink.

The fourth species of the genus to be found in the Philippines, apparently closely allied to *Rauwolfia verticillata* Baill. of China.

Genus **PARSONSIA** R. Brown**Parsonsia oblongifolia** sp. nov.

Scandens, glabra vel subglabra, foliis oblongis ad lanceolatis, coriaceis, 7 ad 10 cm longis, 2 ad 2.5 cm latis, in siccitate brun-neo-olivaceis, nitidis, subtus pallidis, apice acutis vel breviter

acuminatis, basi obtusis ad acutis, nervis utrinque circiter 8, patulis, anastomosantibus, reticulis obsoletis. Inflorescentiis longe pedunculatis, cymosis, circiter 6 cm diametro; floribus breviter pedicellatis, sepalis oblango-ovatis, obtusis, 2 mm longis, corollae tubo 3 mm longo, lobis anguste oblongis, obtusis, 5 mm longis; filamentis spiraliter contortis, leviter villosis, antheris anguste lanceolatis, 3 mm longis; folliculis anguste lanceolatis, 14 cm longis.

Scandent, somewhat woody, glabrous or nearly so, the branches and branchlets pale or brownish, the latter minutely verruculose. Leaves opposite, coriaceous, oblong to lanceolate, 7 to 10 cm long, 2 to 2.5 cm wide, glabrous, brownish olivaceous, shining, the lower surface pale, apex acute to shortly acuminate, base obtuse to acute; nerves about 8 on each side of the midrib, rather thick, spreading, anastomosing, the reticulations obsolete; petioles 1 to 1.3 cm long. Inflorescences cymose, slightly pubescent, about 6 cm in diameter, their peduncles up to 5 cm in length. Pedicels 4 to 8 mm long, the subtending bracteoles ovate, acute, about 1 mm long. Calyx lobes oblong-ovate, obtuse, 2 mm long, eglandular. Corolla tube 3 mm long, glabrous, throat not bearded, the lobes narrowly oblong, obtuse, 5 mm long. Disk lobes 5, fleshy, narrowly ovoid, 1 mm long. Filaments spirally twisted, slightly villous, the anthers narrowly lanceolate, 3 mm long. Follicles narrowly lanceolate, acuminate, about 14 cm long, less than 1 cm in diameter.

Luzon, Rizal Province, Paningtingan, Loher 13477, March, 1915.

A species allied to *Parsonsia oblancifolia* Merr., differing in its coriaceous, differently shaped leaves, and in its long-peduncled inflorescences.

Genus CARRUTHERSIA Seemann

Carruthersia axilliflora sp. nov.

Frutex scandens, ramulis foliisque subtus ad costa nervisque parce ciliato-setosis; foliis oblongis, chartaceis, acuminatis, basi rotundatis, 6 ad 10 cm longis, nervis utrinque circiter 9, perspicuis; inflorescentiis axillaribus floribus fasciculatis vel solitariis, breviter pedicellatis, glabris, circiter 1 cm diametro, corollae tubo 6 mm longo, intus dense viloso.

A slender scandent shrub, the branches terete, glabrous, about 2 mm in diameter, the branchlets sparingly ciliate-setose, the pale spreading hairs 1 to 1.5 mm long, similar hairs on the upper

surfaces of young leaves, and on the midrib and nerves of mature leaves beneath. Leaves oblong, chartaceous, 6 to 10 cm long, 2 to 4.5 cm wide, base rounded, apex conspicuously acuminate, the upper surface pale olivaceous, the lower surface brown when dry; lateral nerves about 9 on each side of the midrib, very prominent on the lower surface, arched-anastomosing, the reticulations lax, distinct; petioles 4 to 10 mm long, the younger ones ciliate-setose, the older ones glabrous. Flowers axillary, solitary or in very few-flowered fascicles, their pedicels about 3 mm long, the bracteoles broadly ovate, 0.5 mm long. Calyx about 2 mm long and wide, glabrous, narrowed below, the lobes triangular-ovate, acute, 1 mm long. Corolla tube slender, glabrous externally, about 6 mm long, distinctly inflated about 1.5 mm above the base, the lobes spreading, somewhat falcate, about 5 mm long and 2 mm wide, inequilaterally rostrate-acuminate, the tube and throat inside densely villous. Anthers inserted in the inflated part of the tube, narrowly lanceolate, acuminate, base obtuse, not united to the stigma, 1.2 mm long. Carpels 2, glabrous, about 1 mm long, the style and stigma 1.5 mm long, the ovules numerous in each carpel.

LUZON, Rizal Province, Montalban, *Lohar 12351*, October, 1909.

A very strongly marked species characterized by its small, axillary, solitary or fascicled flowers and by the scattered, ciliate-setose hairs on the younger branchlets and petioles and on the midrib and lateral nerves on the lower surface of the mature leaves.

Genus **MELODINUS** Forster

Melodinus lanceolatus sp. nov.

Frutex scandens partibus junioribus inflorescentiisque exceptis glaber, ramis glabris, ramulis leviter pubescentibus; foliis lanceolatis, junioribus leviter pubescentibus, vetustioribus glabris, coriaceis, lanceolatis, in siccitate brunneis, 5 ad 10 cm longis, 1.5 ad 2.5 cm latis, basi acutis, apice obtuse acuminatis, nervis primariis utrinque circiter 20, tenuibus; inflorescentiis brevibus, terminalibus, paucifloris; corollae tubo 11 mm longi, extus cinereo-pubescente, intus dense villoso, lobis oblongo-ellipticis, 8 mm longis, 4 mm latis, obtusis, extus pubescentibus; sepalis oblongo-ovatis, acutis vel leviter acuminatis, 3.5 mm longis, extus pubescentibus.

A scandent shrub, glabrous except the younger parts and the inflorescences, the branches terete, dark when dry, the branchlets, young leaves, and inflorescences pubescent with short hairs.

Leaves lanceolate, coriaceous, usually brown when dry, in maturity entirely glabrous, 5 to 10 cm long, 1.5 to 2.5 cm wide, base acute, narrowed upward to the blunt-acuminate apex, the lateral nerves about 20 on each side of the midrib, slender, not conspicuous; petioles about 5 mm long. Cymes terminal, short, rather few-flowered, shorter than the normal leaves, the flowers intermixed with reduced leaves. Pedicels 2 to 3 mm long, the bracteoles ovate, acute, pubescent, 2 mm long. Sepals oblong-ovate, acute or somewhat acuminate, 3.5 mm long, pubescent externally. Corolla tube pubescent externally, densely villous inside, somewhat widened upward, 11 mm long, the lobes coriaceous, oblong-elliptic, obtuse, 8 mm long, 4 mm wide, pubescent outside. Anthers narrowly lanceolate, 1.5 mm long, acuminate, the short filaments villous.

Luzon, Rizal Province, without definite locality, Loher 15057.

A species allied to *Melodinus cumingii* A. DC., but with smaller, narrower leaves and acute or acuminate calyx segments.

ASCLEPIADACEÆ

Genus TYLOPHORA R. Brown

Tylophora lancilimba sp. nov.

Herbacea, scandens, glabra, ramis striatis, 2 mm diametro; foliis lanceolatis, membranaceis, in siccitate pallidis, 6 ad 13 cm longis, 7 ad 15 mm latis, tenuiter acuminatis, basi subacutis ad abrupte truncato-subrotundatis, nervis utrinque circiter 15, patulis, obscuris, anastomosantibus, petiolo 1 ad 1.5 cm longo; inflorescentiis axillaribus, laxis, multifloris, 10 ad 12 cm longis; floribus circiter 4.5 mm diametro, petalis oblongo-ovatis, obtusis, 2.2 mm longis, sepalis oblongo-lanceolatis, 1 mm longis, corona 1 mm diametro.

A slender, herbaceous, glabrous vine, the branches striate, 2 mm in diameter, greenish olivaceous when dry. Leaves lanceolate, membranaceous, 6 to 13 cm long, 7 to 15 mm wide, narrowed upward to the slenderly and acutely acuminate apex, the base subacute to rather abruptly subtruncate-rounded, pale when dry; lateral nerves slender, indistinct, anastomosing, spreading, about 15 on each side of the midrib, the reticulations nearly obsolete; petioles 1 to 1.5 cm long. Inflorescences axillary, diffuse, lax, spreading, many-flowered, 10 to 12 cm long, the pedicels slender, up to 1 cm in length, the flowers fascicled at the nodes of the inflorescence branches. Sepals oblong-lanceolate, 1 mm long.

Petals oblong-ovate, obtuse, 2.2 mm long. Corona ovoid, 1 mm in diameter.

Luzon, Rizal Province, without definite locality, *Loher 14834*, August, 1914.

A strongly marked species, well characterized by its long, slender, lanceolate, slenderly acuminate leaves and its very lax inflorescences.

ACANTHACEÆ

Genus *GYMNOSTACHYUM* Nees

Gymnostachyum trichosepalum sp. nov.

Herba erecta, omnibus partibus cinereo-pubescentibus; foliis membranaceis, ovatis, 4 ad 6 cm longis, acutis vel obtusis, basi rotundatis, nervis utrinque circiter 4, obscuris; spicis longis, tenuibus, 15 ad 20 cm longis, bracteis linear-lanceolatis, tenuiter acuminatis, 4 mm longis, dense capitato-pubescentibus; sepalis linear-lanceolatis, capitato-glandulosis, tenuiter acuminatis, quam bracteis paullo longioribus; capsulis circiter 12 mm longis, pubescentibus, seminibus 8.

An erect herb, all parts rather densely cinereous-pubescent, the stems usually unbranched, about 3 mm in diameter, somewhat woody below. Leaves ovate, 4 to 6 cm long, membranaceous, acute or obtuse, base rounded, rarely subacute, the lateral nerves obscure, usually 4 on each side of the midrib; petioles densely pubescent, 1 to 2 cm long. Spikes slender, 15 to 20 cm long, densely pubescent with short, cinereous, capitate-glandular hairs, the flowers numerous, solitary. Bracts linear-lanceolate, slenderly acuminate, about 4 mm long, densely covered with short, cinereous, capitate-glandular hairs. Sepals similar to the bracts but slightly longer. Corolla not seen. Capsules cinereous-pubescent, about 12 mm long, the valves recurved, seeds usually 8.

Luzon, Rizal Province, Paningtingan, *Loher 13484*, March, 1915.

A strongly marked species, well characterized by its indumentum and especially by its elongate slender spikes, the rachis, bracts, and sepals being densely capitate-glandular with short cinereous hairs.

Genus *PERISTROPHE* Nees

Peristrophe caudatifolia sp. nov.

Herba erecta, ramosa, partibus junioribus plus minusve pubescentibus, foliis floralibus (bracteis) inaequimagnis, ad costa

marginea perspicue ciliatis, majoribus circiter 2 cm longis; foliis lanceolatis, membranaceis, tenuissime caudato-acuminatis, 10 ad 20 cm longis; floribus circiter 2.5 cm longis, corolla in $\frac{1}{2}$ superiore parte leviter hirsuta.

An erect branched herb, the stems about 2 mm in diameter, pale, somewhat sulcate, glabrous, conspicuously constricted just above the nodes when dry, the younger branches somewhat pubescent. Leaves membranaceous, dark olivaceous, lanceolate, glabrous, or the upper surface with few, widely scattered, flaccid hairs, the cystoliths evident on both surfaces, 10 to 20 cm long, 1.5 to 3 cm wide, narrowed below to the cuneate base and above to the very slenderly caudate-acuminate apex, the acumen up to 3.5 cm long; lateral nerves about 9 on each side of the midrib, distinct. Inflorescences up to 8 cm long, the rachis and branches rather densely pubescent. Floral leaves unequal, prominently nerved, reticulate, conspicuously ciliate on the midrib and margins, the larger of each pair 2 cm long, 1 cm wide, elliptic to oblong-elliptic, acute, the smaller lanceolate, somewhat acuminate, 1.5 cm long, 5 mm wide. Flowers about 2.5 cm long, the bracts and bracteoles linear, long-acuminate, ciliate, about 12 mm long, 1 mm wide or less. Calyx lobes equal, linear, acuminate, ciliate, 7 mm long. Corolla tube very slender in the lower half, less than 1 mm in diameter, glabrous, then widened and more or less hirsute in the upper part, the lips subequal, about 9 mm long, the upper one entire, the lower one shortly 3-lobed, lobes oblong, obtuse, 1.5 mm long. Filaments and style glabrous; anthers 3 to 3.5 mm long, the cells two, obtuse, one higher than the other, overlapping for about half their length.

Luzon, Rizal Province, Montalban, Loher 12196, July, 1908.

The alliance of this very characteristic species is with *Peristrophe lancifolia* Merr. from which, among other characters, it is distinguished by its unusually slender caudate-acuminate leaves and its conspicuously ciliate floral leaves (bracts).

RUBIACEÆ

Genus PAVETTA Linnæus

Pavetta loheri sp. nov.

Frutex vel arbor parva, plus minusve pubescentibus; foliis lanceolatis, in siccitate nigricantibus, tenuiter subcaudato-acuminatis, basi cuneatis, subcoriaceis, 9 ad 15 cm longis, 2 ad 3.5 cm latis, supra glabris, nitidis, subtus pubescentibus, nervis utrinque circiter 6, adscendentibus, distinctis; floribus confertis, in-

florescentiis terminalibus, 3 ad 4 cm diametro, calycis dense hirsutis; corollae tubo leviter hirsuto, 7 mm longo, lobis anguste oblongis, obtusis, tubo aequantibus; ovario 2-loculare, loculis 1-ovulatis; stylis deorsum leviter hirsutis, exsertis, 2 cm longis; fructibus globosis, circiter 6 mm diametro, in siccitate pruinosis, seminibus binis, cupulatis.

A shrub or small tree, the branches somewhat reddish brown, terete, glabrous, the slender branchlets rather densely hirsute. Leaves lanceolate to narrowly oblong-lanceolate, 9 to 15 cm long, 2 to 3.5 cm wide, narrowed to the cuneate base and to the slenderly subcaudate-acuminate apex, subcoriaceous, the upper surface glabrous, shining, black when dry, the lower surface pubescent with scattered hairs arising from minute papillæ; lateral nerves about 6, ascending, distinct, curved-anastomosing; petioles hirsute, 5 to 10 mm long; stipules lanceolate, acuminate, appressed-hirsute, about 5 mm long. Inflorescences terminal, shortly peduncled, 3 to 4 cm in diameter, the 5-merous flowers crowded, the peduncles, branches, pedicels, bracts, and calyces densely hirsute. Bracts and bracteoles linear-lanceolate, the former up to 4 mm long, the latter half as long or less. Calyx tube 2 mm long, the lobes lanceolate, acuminate, half as long as the tube. Corolla white, black when dry, the tube 7 mm long, somewhat hirsute, the lobes about as long as the tube, narrowly oblong, obtuse, 2 mm wide, slightly hirsute on the back. Anthers lanceolate, 6 mm long. Ovary 2-celled, cells 1-ovulate. Style exserted, 2 cm long, slender, sparingly hirsute below. Fruits globose, glabrous, somewhat reticulate, pruinose when dry, about 6 mm in diameter. Seeds 2, hard, cupped.

Luzon, Rizal Province, Panitingan, Loher 12623, 13151 (type), 13212, 14211, flowering in February and March, fruiting in October.

A strongly marked species, well characterized by its indumentum, its lanceolate, subcaudate-acuminate leaves, and its densely crowded flowers.

Genus RANDIA Houstoun

Randia loheri sp. nov.

Species *R. microcarpae* (Bartl.) Merr. affinis, differt foliis subtus in axillis haud glandulosis vel barbatis, inflorescentiis paucifloris, floribus plerumque binis, fructibus ellipsoideis.

An unarmed shrub or small tree, glabrous except the very slightly pubescent sepals, the branches and branchlets slender, terete. Leaves oblong-ovate to oblong-elliptic, chartaceous to

subcoriaceous, olivaceous, 6 to 11 cm long, 2.5 to 4.5 cm wide, smooth, dull, base acute, apex conspicuously acuminate, lateral nerves about 5 on each side of the midrib, distinct, not glandular or bearded in the axils beneath, obscurely curved-anastomosing, the reticulations obsolete or nearly so; petioles 5 to 10 mm long; stipules lanceolate from a broader base, 2 mm long. Inflorescences axillary, solitary, usually 2-flowered, the peduncles 1.5 to 2 cm long, the pedicels about 1 cm long with a pair of oblong-ovate, acuminate bracteoles near the base. Flowers white, black when dry. Calyx somewhat urceolate, the tube 5 mm long, glabrous or nearly so, the lobes lanceolate, slightly pubescent, 1.5 to 2 mm long. Corolla tube somewhat widened upward, 7 to 8 mm long, glabrous outside, the lobes elliptic-oblong, subacute to obtuse, about 7 mm long. Fruit ellipsoid, about 1.5 cm long, black when dry, glabrous, crowned by the cylindric remains of the upper part of the calyx tube.

Luzon, Rizal Province, Paningtingan and Montalban, Loher 13161 (type) 12967, flowering in March, fruiting in October.

The very evident alliances of this species are with *Randia microcarpa* (Bartl.) Merr., but there are notable differences in the vegetative, floral, and fruit characters as indicated in the diagnosis.

Genus *UNCARIA* Schreber

Uncaria luzoniensis sp. nov.

Species *U. acidae* Roxb. affinis, differt inflorescentiis exceptis glaberrima, foliis subcaudato-acuminatis, pedunculis brevioribus (ca. 1 cm longis), bracteis oblongis, haud concavis, floribus minoribus (corollae tubo vix 5 mm longo).

Scendent, entirely glabrous excepting the inflorescences. Branches and branchlets terete, smooth, subolivaceous. Leaves firmly chartaceous, brownish olivaceous, somewhat shining, elliptic-ovate, 7 to 8 cm long, about 4 cm wide, apex conspicuously subcaudate-acuminate, base acute; lateral nerves 3 on each side of the midrib, curved-ascending, obscurely anastomosing, reticulations obscure; petioles about 1 cm long; stipules caducous. Heads axillary, solitary, in anthesis about 2.5 cm in diameter, the peduncles 10 to 12 mm long, pubescent, jointed about 4 mm above the base and here supplied with a pair of oblong, obtuse, deciduous, flat bracts about 2.5 mm long. Flowers ebracteolate, sessile, ferruginous-pubescent with short hairs, the calyx somewhat urceolate, about 5 mm long, the broad obtuse lobes 0.5 mm long or less. Corolla tube pubescent, about 5 mm long, slender, the

lobes elliptic, pubescent on the back, about 1.8 mm long. Style glabrous, exserted, about 1 cm long.

Luzon, Rizal Province, Mabiluang, Loher 14457, October, 1913.

Genus **WILLIAMSIA** Merrill

Williamsia loheri sp. nov.

Frutex vel arbor parva, subglabra, ramis ramulisque teretibus, glabris, vel ramulis leviter compressis; foliis subcoriaceis, oblongis, pallide olivaceis, 7 ad 10 cm longis, tenuiter caudato-acuminatis, basi acutis ad rotundatis, utrinque ad costa nervisque parce ciliatis glabrescentibus, nervis utrinque 9 vel 10, valde perspicuis, curvato-ascendingibus; floribus axillaribus, solitariis vel fasciculatis, 6-meris, involucris leviter pilosis, inferioribus subquadratis, 2 mm diametro, interioribus majoribus, subcupulatis, 4 ad 7 mm diametro, 4-lobatis; calycis cupulatis, 5 mm diametro; petalis coriaceis, rigidis, extus glabrat, lanceolatis, acutis, 6 ad 7 mm longis.

A nearly glabrous shrub or small tree, the branches terete, brownish, the branchlets slender, terete or slightly compressed, about 1.5 mm in diameter, glabrous. Leaves subcoriaceous, oblong, slenderly caudate-acuminate, the acumen 1 to 2 cm long, base acute to rounded, pale olivaceous when dry, both surfaces sparingly ciliate on the midrib and lateral nerves, becoming glabrous or nearly so; lateral nerves 9 or 10 on each side of the midrib, very prominent on the lower surface, curved-ascending, the reticulations distinct; petioles about 1 cm long; stipules lanceolate, acuminate, glabrous, about 1.5 cm long. Flowers axillary, solitary or fascicled, sessile, the outer basal involucre slightly pubescent, subquadrate, 2 mm in diameter, irregularly lobed, the inner one larger, subcupulate, 4 to 7 mm in diameter, rather deeply 4-lobed, the lobes irregular, somewhat pubescent, ovate, obtuse, up to 2 mm long. Calyx coriaceous, cup-shaped, slightly pubescent, about 5 mm in diameter, shortly 4-lobed, the lobes unequal, two distinctly larger than the others. Corolla lobes 6, lanceolate, acute, rigid, coriaceous, glabrous externally, 6 to 7 mm long, the tube very short, throat densely bearded. Anthers lanceolate, 2 mm long.

Luzon, Rizal Province, Montalban, Loher 12309, October, 1909.

A species strongly characterized by its prominently nerved, slenderly caudate-acuminate leaves, in many respects resembling *Williamsia glabra* Merr., but not closely allied to that species.

Williamsia stenophylla sp. nov.

Frutex vel arbor parva, subglabra, ramulis tenuibus, 1 ad 1.5 mm diametro, glabris; foliis anguste lanceolatis, tenuissime caudato-acuminatis, chartaceis, pallidis, supra glabris, subtus leviter pubescentibus, 10 ad 13 cm longis, 1 ad 1.5 cm latis, nervis utrinque circiter 7, tenuibus, adscendentibus; fructibus ovoideis, glabris, circiter 1 cm longis, 6-locellatis.

A nearly glabrous shrub or small tree, the branches and branchlets slender, pale, terete, glabrous, the ultimate branchlets 1 to 1.5 mm in diameter. Leaves chartaceous, pale, narrowly lanceolate, 10 to 13 cm long, 1 to 1.5 cm wide, narrowed below to the acute base and above to the very slenderly caudate-acuminate apex, the acumen straight or somewhat falcate, 2 to 2.5 cm long, the upper surface glabrous, the lower surface sparingly appressed-pubescent on the midrib and lateral nerves; nerves about 7 on each side of the midrib, slender, distinct, ascending; petioles slender, 10 to 13 mm long; stipules linear-oblong, equaling the petioles. Flowers axillary, apparently solitary. Fruits sessile, ovoid, glabrous, about 1 cm long, 6-celled, crowned by the persistent calyx tube which is slightly pubescent, the lobes 4, oblong-ovate, obtuse, about 1.5 mm long. Basal involucres somewhat pubescent, the lower one subquadrate, about 2 mm in diameter, the inner one 6 mm in diameter, irregularly 4-lobed, the lobes orbicular to broadly ovate, rounded, 2.5 to 3.5 mm wide.

Luzon, Nueva Vizcaya Province, Caraballo Mountains, Loher s. n., March, 1915.

A very characteristic species, at once recognizable by its narrowly lanceolate, slenderly caudate-acuminate, few-nerved leaves.

MAGELLANIA DICKERSONI, A NEW SPECIES OF BRACHIOPOD

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ONE PLATE AND ONE TEXT FIGURE

Magellania dicksoni sp. nov. Plate 1.

A peculiar form of *Magellania*. The shell is roughly pyramidal in outline, the dorsal valve forming the base of the pyramid. The ventral valve is divided into three parts, or lobes, the lateral ones almost perpendicularly deflected against the median one. The three lobes are nearly equal in width. The divergent ridges dividing the three lobes are not very distinct in the umbonal region, which is rather conical; the ridges, however, become more and more remarkable anteriorly, and give rise to very clear and quite sharply angular sinuses along the anterior commissure. The median part, or lobe, is very gently rounded in the front and makes a wide fold between these two angular sinuses. Lateral parts are nearly flat, but have a rounded margin, thus the ventral view of the brachiopod presents the appearance of an isosceles triangle with more or less strongly convex lateral sides. The umbonal region is more or less tumid, and the beak is somewhat pointed, truncated by a small round pedicle foramen. The pedicle foramen is complete, but the deltidium beneath it is not well preserved; it is probably composed of discrete plates. The beak does not quite hang over the opposite one.

The dorsal valve is almost regularly triangular in outline, with a rather obtuse top in the beak, and two down-pointed basal angles; the basal or the anterior angles of the dorsal valve are pointed so as to fix the two angular sinuses of the opposite valve described above. In the anterior view the anterior margin of the dorsal valve is naturally rather strongly folded up, and thus the general surface of the dorsal valve is flat.

The surface of the valves is generally smooth, but sometimes there are very faint concentric lines distinguishable under a magnifying glass. The shell is minutely and densely punctate; the punctures number about 50 to 60 or more in 5 square millimeters.

These characters have been observed in adult and typical forms of the species, which are about 25, 22, and 13 millimeters in length, width, and thickness, respectively. There are several smaller specimens that have the same characteristics.

In still younger forms the diverging ridges that divide the three lobes are not quite developed, although the particular gibbosity of the median portion is indicated in some of them. The dorsal valves are far less convex or, rather, nearly flat, and the ventral ones are strongly vaulted, in general.

It has been very difficult to examine the interior of the brachiopods. However, it is certain that the dorsal valve possesses a median septum inside, which reaches beyond the middle of the valve. In some of the specimens the existence of such a median septum is indicated by a dark line on the outer surface. In one of the specimens a peculiar loop, or at least a part of it, was detected. At the distal end of the median septum a small, funnel-shaped ring is attached; this ring is of a filament of variable width. The ring is somewhat elongate in the direction of the septum, and the diameter of its outer side is much larger than that of its proximal side. It is noteworthy that the direction of the ring is nearly perpendicular to the inner surface of the dorsal valve, or the direction of the septum itself.

Remarks.—It was with great hesitation that I determined this species, because the internal structure was not accessible to me until recently. However, the discovery of the ring-formed filament facilitated determination. This filament is found in the "Bouchardiform" and "Megerliniform" stages of some of the species of the genus *Magellania*, as schemed by Beecher;¹ these two stages were collectively called the "Pre-Magadiform" stage by Thomson,² more recently. If the filament ring be only a part of the entire loop, this fossil cannot be much more advanced than the "Magadiniform" stage.¹

The general outline of the fossils is of the type of *Magellania* (*Waldheimia*)³ *septigera*⁴ and *raphaelis*,⁵ as shown by the pictures in Davidson's monograph of recent brachiopods. In both

¹ Studies in Evolution (1901) 286–309, pls. 13 and 14. A similar ring is also found in a younger specimen of *Waldheimia lenticularis* as shown by Douville, Bull. Soc. Geol. Fr. III 7 (1878–1879) 255, 256.

² Geol. Mag. 3 (1916) 497.

³ *Waldheimia* is substituted by *Magellania* by Schuchert in Eastman's Text-Book of Paleontology (1913) 408.

⁴ Monogr. Rec. Brach. p. 56, pl. 11, figs. 1–10.

⁵ Op. cit. p. 58, pl. 11, figs. 11–13.

of these species the threefold division of the ventral valve is very well represented. Although in the first-named species the dorsal valve is much less convex than the ventral, the relative dimensions are different. In point of general outline, the last-named resembles the present fossil species much more closely, but the three folds are not developed in the same way as in *Magellania dickersoni*.

Davidson illustrates several stages of the loops of *Magellania septigera*. In the older stages, however, there is no ring making a part of the loop, whereas the ring is found in an adult specimen of the Philippine species.

It is very unfortunate that the literature in the Institute of Geology and Paleontology of Sendai on the Cenozoic and younger brachiopods is not very complete. I have been unable to find any fossil species much more closely allied to the present species than those Recent forms cited above. The literature on the South Pacific forms is especially important for the determination of the present fossil from the Philippines, as well as those from Japan, either fossil or Recent.

According to Thomson,⁶ *Magellania* is one of the six genera that are restricted to the Australian Region. However, this genus seems to have been distributed somewhat more widely during the Tertiary period; for, as I have reported in a recent paper,⁷ there are fossil forms of the genus in Japan. It is recorded that the genus *Magellania* existed in Miocene-Oligocene time in the Australian sea, while the forms allied to it are found in the Oligocene-Miocene faunas of Chile and the Antarctic. On the other hand, Thomson mentions as one of the characteristics of the Antarctic Recent fauna the presence of the genus *Magellania* s. s. which is restricted to the Miocene in Australia.⁸ Further research seems to be necessary for a discussion of this kind; Cenozoic as well as Recent forms of brachiopods of Japan and the Philippines seem to be especially important.

⁶ Australian Antarctic Expedition 1911-1914. Sci. Rep. ser. C. 4²: 40.

⁷ Sci. Rep. Tohoku Imp. Univ. II 6 (1922) 155.

⁸ Op. cit. p. 54, 55.

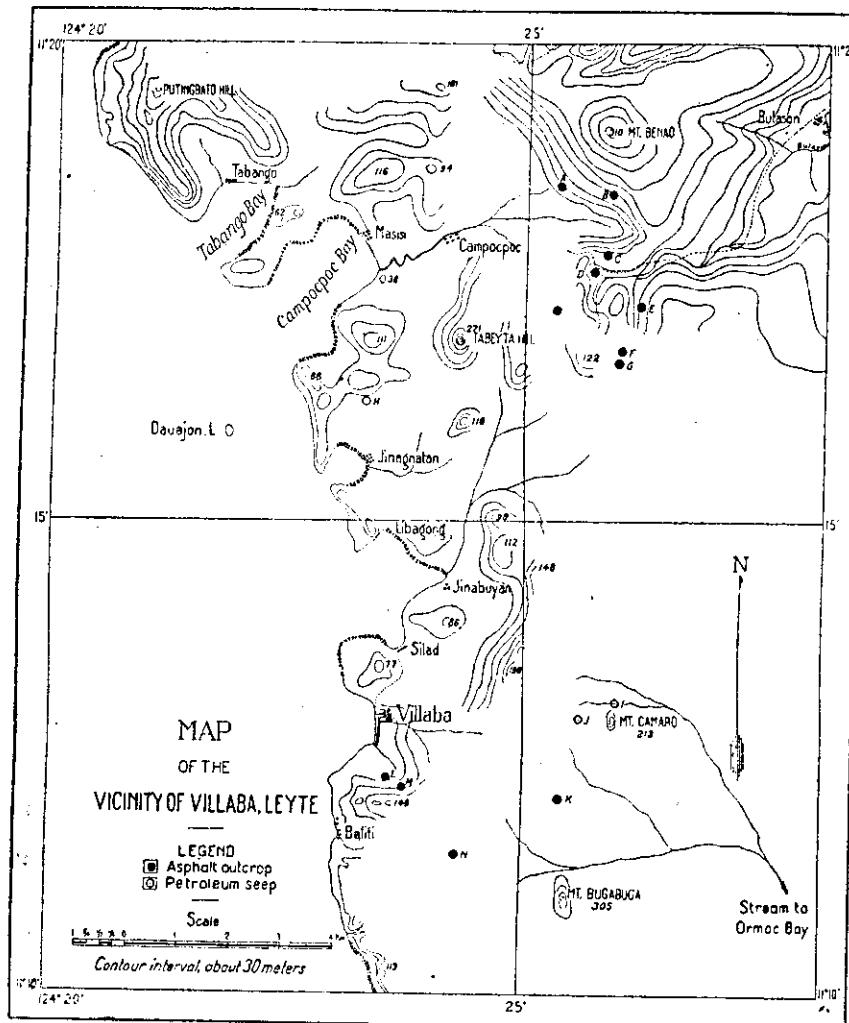


FIG. 1: Map of the Vicinity of Villaba, Leyte

Geologic age, Pliocene or Miocene.—Mr. Graham B. Moody assigns the tuffaceous sandstones, from which the fossil herein described was collected, to the Malumbang Pliocene, while Dr. Roy E. Dickerson regards them as being in the Canguinsa formation of the Vigo (Miocene) group. The type locality of *Magellania dickersoni* is described as follows:

Dickerson's locality 18, Philippine Islands, Leyte Island, west coast, east of north end of Cebu, 3.5 kilometers north of Villaba and 1 kilometer northwest of Libagong barrio, in sea cliff, brown tuff which dips 22° south and has a strike of north 57° west. January 16, 1920. Roy E. Dickerson, collector.

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ILLUSTRATIONS

PLATE 1. MAGELLANIA DICKERSONI SP. NOV.

- FIG. 1. Type specimen, $\times \frac{1}{2}$; *a*, dorsal view; *b*, ventral view; *c*, lateral view.
2. A cotype, $\times \frac{1}{2}$; *a*, dorsal view; *b*, ventral view; *c*, lateral view.
3. Another cotype; *a*, dorsal view; *b*, ventral view; *c*, lateral view.
4. View of shell showing its pectinate character, about $\times 6$.
5. Sketch showing the character of the loop, $\times 4.5$.

TEXT FIGURE

- FIG. 1. Map of the vicinity of Villaba, Leyte.

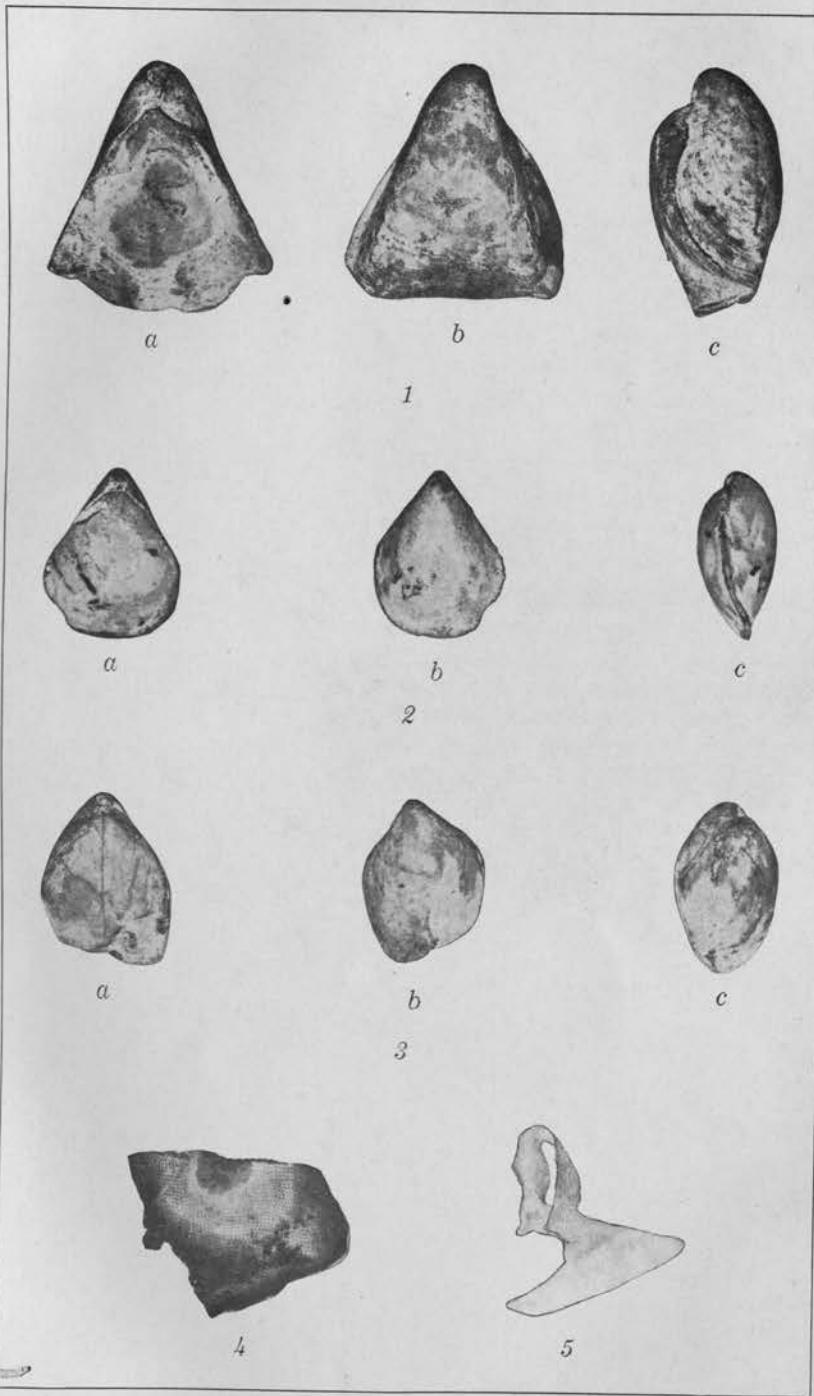


PLATE 1.

NEW PHILIPPINE CETONIIDÆ

By J. MOSER

Ellrich im Harz, Germany

Euglypta bakeri sp. nov.

♂. Nigra, opaca, albo-signata. Capite fortiter punctato, fronte strigillata, biimpressa, clypeo margine antico profunde emarginato, prothorace postice parum latiore quam longiore, antrorsum attenuato, lateribus leviter bisinuatis, basi ante scutellum paulo sinuata, dorso utrinque vitta longitudinali alba postice abbreviata, ornato; scutello nigro; elytris basi prothorace latioribus, postice attenuatis, lateribus post humeros sinuatis, sutura postice elevata, apice spinoso; elytris singulis fascia transversa antemedia, macula laterali postmedia maculaque oblonga apicali albis; pygidio aciculato-punctato, vitta media longitudinali alba. Subtus medio nigro nitido, lateribus albis; processu mesosternali paulo convexo; tibiis anticis tridentatis, tibiis posticis intus nigro-ciliatis. Long. 17 mm.

NEGROS, Occidental Negros, Cuernos Mountains (*C. F. Baker* leg.).

Glycyphana rubroscutellaris Mohn. var. *nigroscutellaris* var. nov.

A forma typica differt: scutello nigro.

MINDANAO, Lanao Province, Mumungan. LEYTE, Santa Cruz (*G. Boettcher* leg.).

Glycyphana rubroscutellaris Mohn. var. *immarginicollis* var. nov.

A forma typica differt: scutello nigro, prothorace haud rubro-marginato.

NEGROS, Occidental Negros, Cuernos Mountains (*Baker* leg.).

Glycyphana aethiessida White var. *immaculata* var. nov.

A forma typica differt: prothorace elytrisque nigris, haud flavo-maculatis.

PANAY (northwestern part) (*Baker* leg.).

NEW OR LITTLE-KNOWN TIPULIDÆ FROM THE
PHILIPPINES (DIPTERA), PART II¹

By CHARLES P. ALEXANDER

Of Amherst, Massachusetts

Through the kindness of Prof. Charles Fuller Baker and Mr. Richard C. McGregor, I have now seen a number of additional species of Philippine crane flies; the undescribed forms are described herein. All of the specimens were taken in Luzon with the exception of a magnificent *Pselliophora* from Sibuyan. Except where stated to the contrary, the types are retained in my collection, through the great kindness of the collectors.

LIMNOBIINÆ

Geranomyia (Geranomyia) cornigera Alexander.

• *Geranomyia cornigera* ALEXANDER, Insec. Inscit. Menst. 1 (1913); 137 to 139.

A male specimen from Manila, January 12, 1922 (McGregor). The species was described from material taken at Pettit Barracks, Philippines, October 22–23, 1912, and had not been found again until the present record.

Dicranomyia (Alexandriaria) brevissima sp. nov.

General coloration yellow, the prescutum, scutal lobes, and parts of the postnotum shiny black; wings faintly tinged with brown, clearer before and beyond the darker brown stigma; Rs transverse, very short, crossing the proximal end of the stigma.

Female.—Length, about 3 millimeters; wing, 4.1.

Rostrum yellow, the palpi dark brown. Antennæ with the scapal segments testaceous; flagellar segments pale brown, the basal segments short-oval, thence passing into elongate-oval. Head yellow; vertex between the eyes very narrow.

Pronotum yellow. Mesonotal prescutum shiny black, the humeral triangles light yellow; scutum black, the median area

¹For Part I see Philip. Journ. Sci. 21 (1922) 373–384.

brown; scutellum brown; postnotal mediotergite brown, the lateral margins black; pleurotergite black. Pleura light yellow. Halteres broken. Legs with the coxae and trochanters pale yellow; remainder of the legs broken. Wings with a faint brown tinge, extensively clearer before and beyond the stigma which is dark brown, short-oval; veins brown. Venation: Sc short, the distance between the tip of Sc_1 and origin of Rs approximately three times the length of Rs ; Sc_2 some distance from the tip of Sc_1 ; Rs very short, perfectly transverse, and in alignment with the transverse basal third of the deflection of R_{4+5} ; at the juncture of these veins, a long spur juts proximad into cell R; Rs thus crosses the extreme proximal end of the stigma and r its distal end, cell 1st R_1 being entirely included in the stigma; basal deflection of R_{4+5} angulated and feebly spurred at one-third its length; basal deflection of Cu_1 approximately at the fork of M.

Abdomen dark brown, the shields of the ovipositor black; sternites obscure yellow, clearer basally.

Luzon, Mount Maquiling (*Baker*); type, female.

Type returned to Professor Baker.

Lechria philippinensis sp. nov.

General coloration shiny yellow; wings subhyaline, the costal region distinctly infuscated; cell 1st M_2 very long and narrow; vein 2d A short, the cell narrow.

Male.—Length, about 5.8 millimeters; wing, 6.8 to 7.

Rostrum obscure yellow, the palpi brownish black. Antennae black throughout, of moderate length only. Head dark gray, the anterior triangle slightly more silvery.

Pronotum obscure yellow, darker medially. Mesonotum shiny fulvous yellow, the disk of the scutellum and the center of the mediotergite more infuscated. Pleura shiny fulvous, without pruinosity. Halteres yellow, the knobs brown. Legs with the coxae yellow; trochanters yellow, the mesal face at apex with a black spot; femora pale brownish testaceous, the tips indistinctly darkened; tibiae and tarsi darker brown. Wings subhyaline; cells C, Sc, Sc_1 and the stigma distinctly infuscated; veins brownish black. Venation: r-m only a little less than its own length before the fork of Rs ; basal section of R_2 only a little shorter than m-cu; cell 1st M_2 elongate, r-m beyond midlength, m-cu slightly before midlength; basal section of M_3 about equal to or longer than the distal section of R_2 ; vein 2d A short, cell 2d A being very narrow.

Abdomen obscure brownish yellow, the incisures of the segments blackened; subterminal segments darkened to form an ill-defined ring; sternites obscure yellow, the basal lateral angles of the segments darkened; hypopygium yellowish.

Luzon, Manila, April, 1923 (*McGregor*); type, male; paratype, male.

According to my key to the species of *Lechria*,² the present species would run to *L. bengalensis* Brunetti, from which it differs in the diagnostic characters outlined above.

Eriocera cinereithorax sp. nov.

Head and thorax grayish pruinose; antennal flagellum brownish yellow, the terminal segment brownish black; femora obscure yellow, the tips blackened; wings dark brown, the base of cells C and Sc yellow; a pale yellow crossband before the cord; basal half of cell 1st A yellow; abdominal segments 1 and 6 to 8 black, the intermediate segments orange-yellow with a narrow black lateral line.

Male.—Length, 11 to 12 millimeters; wing, 10.5 to 12.5.

Female.—Length, 15 millimeters; wing, 12.

Rostrum black, pruinose; palpi black. Antennæ rather short, the basal segment dark brown, pruinose; second segment a little paler; flagellar segments brownish yellow, the last segment abruptly brownish black; flagellar segments gradually decreasing in length to the last. Head light gray, the sides of the vertex behind a little darker.

Mesonotal prescutum gray with four ill-defined dark brown stripes, the lateral margin of the sclerite likewise darkened; scutum, scutellum, and postnotum black, less heavily dusted with gray. Pleura black, sparsely and irregularly dusted with ashy gray. Halteres black, the extreme base of the stem a little paler in some specimens. Legs with the coxae and trochanters black; femora obscure yellow, the tips rather narrowly blackened; tibiae brown, the tips blackened; tarsi black. Wings dark brown, the prehumeral cell and basal two-thirds of cells C and Sc bright yellow; a conspicuous paler yellow crossband before the cord, lying in cells 1st R₁, R, and M; about the basal half of cell 1st A of the same color; veins black, obscure yellow in the flavous areas. Venation: Sc₁ ending beyond the origin of R₂; Sc₂ opposite two-thirds the length of R₂₊₃; r on R₁ nearly four times its length from the tip and on R₂ a little more than

² Proc. Roy. Soc. Queensland 32 (1920) 102 and 103.

twice its length beyond the fork; R_{2+3} about equal to terminal section of R_1 ; cell M_1 present but very small in the allotype; basal deflection of Cu_1 a little less than its length beyond the fork of M .

Abdomen with the basal segment black; segments 2 to 5 orange-yellow, the lateral line narrowly blackened; caudal margin of segment 5 and all of segments 6 to 8 black; hypopygium yellowish brown, especially the basistyles. In the female, the basal shields of the long ovipositor are reddish.

Luzon, Ilocos Norte Province, Solsona, December, 1923 (*McGregor*); type, male; paratype, male; Piddig, November, 1923 (*McGregor*); allotype, female.

Erioptera (Baeoura) semicincta sp. nov.

General coloration blue-gray; scutum pale yellow; wings grayish subhyaline, with a very broad but ill-defined and indistinct darker band at the level of the cord.

Male.—Length, about 3 millimeters; wing, 3.3.

Rostrum and palpi brown. Antennæ black throughout, the verticils conspicuous. Head broad, clear blue-gray.

Pronotum, mesonotum, and pleura dark, blue-gray pruinose; the prescutum with three confluent darker stripes, the scutal lobes slightly darkened; scutellum broad, pale yellow, the extreme base at the middle with a dark spot. Halteres short, dark brown. Legs with the coxæ yellowish testaceous; femora brownish yellow, the tips broadly dark brown; remainder of legs dark brown. Wings grayish subhyaline, with a very broad, indistinct, ill-delimited darker band crossing the wing at the level of the cord; veins black. Venation: Sc_1 ending about opposite midlength of R_{2+3} ; r about its length beyond the fork of R_{2+3} ; basal deflection of Cu_1 a little more than one-half its length beyond the fork of M ; petiole of cell M_3 a little longer than the basal deflection of Cu_1 ; arculus oblique.

Abdomen dark brown, the intermediate sternites a trifle paler.

Luzon, Ilocos Norte Province, Solsona, December, 1923 (*McGregor*); type, male.

Tenuholabis quinquemaculata sp. nov.

General coloration yellow, the prescutum and scutum with five shiny black markings; wings subhyaline, with the apex and a narrow brown seam along the cord pale brown; Sc_1 ending beyond midlength of Rs , Sc_2 shortly beyond the origin of Rs ; cell 1st M_2 closed.

Male.—Length, 5 millimeters; wing, 6.

Rostrum slender, about as long as the head, black; palpi black. Antennæ with the scapal segments obscure brownish yellow; flagellar segments oval, dark brown. Head shiny black above, the anterior part of the vertex and the front silvery pubescent; genæ and postgenæ shiny brownish yellow.

Cervical sclerites slender. Pronotum shiny yellow, margined around by black. Mesonotal prescutum and scutum shiny yellow with five conspicuous shiny black areas, the three on the prescutum representing the usual stripes, the lateral ones transversely subcircular and only narrowly separated from one another by a rufous median line; median spot restricted to the cephalic margin of the sclerite; scutal marks occupying the centers of the lobes; scutellum yellow, the caudomedial region black; postnotum black. Pleura black, the sternopleurites and meron yellow, the ventral region of the anepisternum with appressed microscopic gray pubescence. Halteres with the stems black, the extreme bases paler, the knobs broken. Legs with the coxæ yellow, the fore coxæ shiny dark brown; trochanters yellow; remainder of legs broken. Wings subhyaline, the apex faintly darkened; a relatively narrow pale brown band across the wing at the level of the cord, the cephalic end (stigma) darker; veins brown. Venation: Sc_1 ending beyond mid-length of Rs , Sc_1 far from its tip and lying only a short distance beyond the origin of Rs , the latter feebly sinuous; r less than its length from the tip of R_1 and approximately the same distance from the fork of Rs ; cell 2d R_1 at wing margin very broad; veins R_{2+3} and R_{4+5} running generally parallel; cell 1st M_2 closed, gently widened distally; basal deflection of Cu_1 about its own length beyond the fork of M ; vein 2d A bent rather strongly to anal margin at its tip.

Abdominal tergites black, the basal sternites brown, the terminal sternites variegated with yellow; sixth sternite with a median hairy organ as in the group; hypopygium black.

Luzon, Mount Maquiling (Baker); type, male.

Type returned to Professor Baker.

Teucholabis confluenta sp. nov.

General coloration shiny black; pronotum and scutum orange-yellow; knobs of halteres orange; wings whitish subhyaline, with three brown crossbands, the outer one apical and including more than the distal sixth of the wing; cell 1st M_2 open by the atrophy of the outer deflection of M_3 .

Male.—Length, 5.6 to 5.8 millimeters; wing, 6.

Rostrum elongate, shiny black, about as long as the head; palpi black. Antennæ with the basal segment of the scape brownish black, the remainder of the organ paler brown; flagellar segments oval, the outer segments becoming more elongated. Head black, slightly pruinose, especially anteriorly.

Pronotum orange-yellow, the elongate cervix black. Mesonotal prescutum uniform shiny black, the scutum uniform orange-yellow; scutellum, parascutella, and postnotum black. Pleura shiny black, the propleura orange. Halteres black, the knobs conspicuously orange. Legs with the coxae and trochanters obscure orange; remainder of the legs broken. Wings whitish subhyaline, with three brown crossbands, including the broad dark apex that includes more than the distal sixth of the entire wing; a broad, nearly uniformly wide band along the cord, a little darker at the stigma, along the caudal margin of the wing connected narrowly with the apical band; a narrower band at the level of the origin of Rs and tip of vein $2d\ A$, a very little widened at vein Cu ; veins dark brown. Venation: Sc_1 ending just before midlength of Rs , Sc_2 shortly before this origin; r a little more than its length from the tip of R_1 and a short distance beyond the fork of Rs ; cell 1st M_2 open by the atrophy of the outer deflection of M_3 ; basal deflection of Cu_1 a little less than one-half its length beyond the fork of M .

Abdomen shiny blue-black throughout, including the hypopygium.

Luzon, Mount Maquiling (*Baker*); holotype, male; paratypes, two males.

Styringomyia flavocostalis sp. nov.

General coloration yellow, the anterior part of the mesonotal prescutum, the lateral margins of the scutal lobes, and the postnotum black; wings tinged with pale brown, variegated with darker brown, the costal margin conspicuously light yellow; $r-m$ lying proximad of R_{2+3} .

Male.—Length, 5.5 millimeters; wing, 3.5.

Rostrum and palpi brown. Antennæ with the basal segments dark brown, paler dorsally; flagellum broken. Head brown, light gray pruinose.

Pronotum and anterior part of mesonotal prescutum dark brown, silvery pruinose, especially in front, the posterior half of the prescutum and anterior half of the scutum obscure yellow; scutal lobes variegated posteriorly and laterally with

brown; scutellum black, broadly yellowish medially at base; postnotum black. Pleura yellow. Halteres pale, the knobs slightly infuscated. Legs with the coxae and trochanters yellow; femora and tibiæ yellow, each with narrow dark brown rings, the femoral rings premedial and postmedial, the tibial rings premedial and apical; tarsi pale, darkening at tips. Wings faintly tinged with brown, the costal margin conspicuously bright yellow; brown clouds along the cord and outer end of cell 1st M., along vein Cu, and at tip of vein 2d A; veins pale brown, darker in the infuscated areas, the costa bright yellow. Venation: R_{2+3} a short distance beyond r-m, which thus connects with the end of Rs; vein 2d A very strongly bent at tip but not spurred.

Abdomen dark brown, the sternites more testaceous; hypopygium yellow. Male hypopygium with the basistyle terminating in a single long spine.

Luzon, Mount Maquiling (*Baker*); holotype, male; paratype, male.

By Edwards' key to the species of *Styringomyia*, the present form runs out at *S. marshalli* Edwards (Mashonaland), a very different fly.

TIPULINÆ

Pselliophora bakeri sp. nov.

General coloration orange-yellow; conspicuously variegated with black; all tibiæ with subbasal white rings; wings black; a conspicuous I-shaped pale yellow mark in the basal cells; basal half of cell 2d A pale yellow; abdomen cross-banded with black.

Female.—Length, about 16 millimeters; wing, 14.8.

Frontal prolongation of head, including the short nasus, yellow; first segment of palpus pale; segments 2 and 3 dark brown, the ends pale, the elongate terminal segment yellow, the distal fourth dark brown. Antennæ 12-segmented; scape yellow; flagellum dark brown. Head yellow; a narrow transverse dark brown line across the vertex immediately behind the antennal bases, very narrowly interrupted by an orange spot at the summit of the vertical tubercle; a conspicuous brown semicircular occipital mark.

Pronotum orange-yellow, conspicuously blackened laterally. Mesonotum orange-yellow, with a handsome black pattern, distributed as follows: Prescutum with three stripes, the lateral stripes very short and lying close to the long medial vitta; scutal

lobes each with two marks, a small spot on the anterolateral portion and a much larger mark on the posteromesal portion, the latter with the caudal ends confluent across the median line; scutellum black; postnotum with the median sclerite yellow, the posterior portion largely covered by a black triangle, the point of which is directed cephalad; postnotal pleurotergites black with a small yellow area on the dorsomesal margin of each. Pleura orange-yellow, with a conspicuous black area surrounding the wing root, beginning immediately cephalad of this root on the mesepisternum, crossing the epimeron; halteres surrounded by black; sternopleurite narrowly blackened ventrally. Halteres yellow, the knobs conspicuously dark brown. Legs with the coxae black, the midcoxae very indistinctly spotted with obscure yellow; trochanters yellow; femora black, the bases narrowly yellow; tibiae black, each with a narrow but conspicuous snowy white ring immediately beyond the base, these rings of approximately equal extent on all the legs; tarsi black. Wings black, the extreme base yellow; a conspicuous pale yellow, --- -shaped mark occupying the disk, the stem lying in parts of both cells R and M for their entire length, the crossbar lying before the cord in cells 1st R₁, the basal half of 1st M₂, and the bases of cells M₃ and Cu₁; basal half of cell 2d A similarly pale yellow; base of cell 1st A and caudal half of Cu grayish; veins black, yellow in the flavous areas. Venation: r-m very short; cell M₁ rather narrowly sessile; m-cu short but distinct.

Abdomen orange, conspicuously cross-banded with black; tergite 1 black; a broad band beyond midlength of tergite 2, subbasal bands on tergites 3 to 8, these becoming broader and more conspicuous on the outer segments, wider at the lateral margins than on the disk. Ovipositor deep horn color, the bases black.

SIBUYAN (Baker); type, female.

This beautiful *Pselliophora* is named in honor of Prof. C. F. Baker, to whom I am indebted for many favors in the past.

Pselliophora mcgregori sp. nov.

Male.—Length, 11.5 to 12 millimeters; wing, 12.

Female.—Length, 17 millimeters; wing, 14.5.

Generally similar to *P. idalia* (Osten-Sacken).

Frontal prolongation of head with a short nasus. Median area of pronotum yellow. Mesonotum velvety black, the usual stripes confluent, the humeral region and broad lateral margins broadly pale yellow; postnotal mediotergite black with a trans-

verse yellow band before the base. A conspicuous yellow spot on the meron. Halteres dark brown, the base of the stem yellow. Legs black, only the extreme bases of the fore femora a trifle paler; all tibiæ with a snowy white ring immediately beyond the base. Wings with the ground color black; cell 2d A pale; in the female, cells R, M, and 1st A with pale linear streaks; extreme base of wing pale. Cell M_1 sessile (male) or short-petiolate (female). Abdomen black; segment 2 with more than the basal half pale yellow; tergites 2 to 5 and sternites 3 to 8 with the caudal margins of the segments conspicuously and broadly banded with yellow; on sternite 8 the yellow color includes more than the apical half of the conspicuously projecting median lobe. Hypopygium elongate-cylindrical, tilted at an angle to the remainder of the abdomen. In the female, the yellow abdominal markings include, besides the marks on segment 2, narrow rings on tergites 3 and 4 and on sternites 2 to 7, becoming smaller and subobsolete outwardly.

Luzon, Ilocos Norte Province, Bangui, November, 1923 (*McGregor*); holotype, male; allotype, female; paratype, male.

This handsome crane fly is dedicated to Mr. Richard C. McGregor, as an appreciation of his valuable coöperation in making known the very interesting tipulid fauna of the Philippines.

Tipulodina luzonica sp. nov.

Antennæ of male relatively long; median prescutal stripe conspicuous; fore femora with a pale subterminal ring; fore and middle tibiæ with a snowy white subterminal ring; posterior tibiæ with a subbasal and a subterminal white ring; basitarsi black, only the narrow tips white; wings clear, the center of the cord not or scarcely seamed with darker; no brown cloud near midlength of cell M; spinous dististyle of male hypopygium small and inconspicuous.

Male.—Length, 14 to 15 millimeters; wing, 14 to 15.

Female.—Length, 18 to 19 millimeters; wing, 14.

Frontal prolongation of head pale above, the sides dark brown; nasus very long and slender, pale. Antennæ of male elongate, if bent backward extending to beyond the base of the abdomen; basal segment testaceous, the tip dark brown; second segment brownish testaceous; flagellum black, the incisures of the segments indistinctly whitish. Head dark brownish gray, the anterior part of vertex and the genæ pale whitish ocherous, the vertex with a dusky area on either side behind the eyes.

Pronotum broadly dark brown medially, the sides buffy yellow. Mesonotal prescutum yellow, especially the humeral region, with a very broad and conspicuous dark brown stripe that is further divided by a capillary darker brown vitta; lateral stripes small and relatively ill defined; scutal lobes obscure yellow, each with two large, dark brown areas; scutellum brownish gray, the parascutella brown; postnotum dark gray. Pleura pale yellow, with a sparse silvery white bloom; postnotal pleurotergite with an oval, silvery area that is bordered, except dorsally, by a conspicuous brown mark immediately before the halteres; a small brown spot immediately ventrad of the metaspiracle. Halteres dark brown, the base of the stem narrowly yellow. Legs with the coxae pale, whitish pruinose, the posterior coxae with a small apical brown spot on caudal face; trochanters testaceous yellow, with a brown spot on mesal face of each; fore femora brownish testaceous, brighter basally, with a conspicuous yellowish white ring before the narrower black tip; midfemora bright brown, the tips narrowly blackened; posterior femora brownish testaceous, the tips broadly and conspicuously blackened; fore and middle tibiae black with a broad, snowy white ring before the slightly broader black apex; posterior tibiae with a similar white ring and an additional narrower subbasal white ring; basitarsi black, the apex of each narrowly white; remainder of tarsi snowy white, excepting the infuscated terminal segment. Wings clear whitish hyaline, highly iridescent; cell Sc brownish black; stigma oval, dark brown, sending a seam along the anterior cord; Cu, Cu₂, and basal deflection of Cu₁ narrowly bordered with brown; wing apex brown, including the apex of cell R₂; the distal two-fifths of R₅ (the latter inclosing a small subhyaline droplet); about the same extent of cell R₅; veins M₁ and M₂ seamed with brown, especially the former, the center of cell M₁ remaining broadly pale; veins slender, brownish black, very distinct. Venation: Basal deflection of R₄₊₅ distinct, nearly as long as r-m; cell 1st M₂ large, the fusion of M₃ and Cu₁ equal to or greater than the basal section of M₃ alone; m and petiole of cell M₁ subequal, the latter cell very short and broad; vein 2d A very short, cell 2d A being thus unusually narrow. In the females, the cord and vein M₁₊₂ are narrowly seamed with brown.

Abdominal tergites bright brown, the lateral margins narrowly, the subcaudal region of the segments rather broadly, blackened; caudal margins of the segments narrowly yellowish; base of tergite 3, and more narrowly on the succeeding tergites,

glabrous, brownish gray; the shorter subterminal tergites are largely black with the bases, lateral margins, and basal lateral angles obscure yellow, more or less pruinose; basal sternites obscure yellow, the subterminal segments gray; hypopygium and eighth sternite yellow to ocherous fulvous. Male hypopygium small, the tergal region very narrow; chitinized hooks of the dististyle small and relatively insignificant, directed dorsad, the acute black tips cephalad.

Luzon, Manila, August, 1923 (*McGregor*); holotype, male; allotype, female; and fourteen paratype males and females.

This handsome fly belongs to the group of the genus with elongate antennæ in the male sex; with no dark spot near mid-length of cell M of the wings; and with the male hypopygium small and without conspicuous appendages. This is undoubtedly the same fly that was referred to *T. pedata* (Wiedemann) by Osten-Sacken,³ but is certainly not the true *pedata*. It may likewise be the species referred by Bezzi⁴ to *Tipulodina cinctipes* (de Meijere), described from Borneo; the latter species is very distinct in the coloration of the basitarsi. The genus is a very characteristic one in the Oriental fauna but is rather difficult to differentiate from *Tipula* on characters of the adult flies. The pupæ differ widely from species of *Tipula*, however, and there is but little doubt of the generic validity of the group. All of the species known pertain to the Ethiopian and Oriental faunæ, although two, *Tipulodina joana* (Alexander) and *T. nipponica* (Alexander), occur in the lower regions of Japan as far north as Tokyo.

³ Berl. Ent. Zeitschr. 26 (1882) 92.

⁴ Philip. Journ. Sci. § D 12 (1917) 111 and 112.

A SECOND LOT OF PARASITIC HYMENOPTERA FROM THE PHILIPPINES

By A. B. GAHAN

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ONE PLATE

This paper contains descriptions of seventeen new species and one new genus, as well as notes on several previously described parasitic Hymenoptera, and includes representatives of the three great superfamilies Ichneumonoidea, Chalcidoidea, and Serphoidea. The greater part of the material treated was received from Charles Fuller Baker, dean of the College of Agriculture, University of the Philippines. Three species of Serphoidea were sent by Anastasio A. Rowan, a student at the same university. More or less definite host records are given for most of the species on the authority of the collectors.

ICHNEUMONOIDEA

BRACONIDÆ

SPATHIINÆ

Genus SPATHIUS Nees

In the new species described below, as well as in *S. philippensis* Ashmead, the type of which has been examined, the median cell of forewing (Plate 1, fig. 2) is broad basally, very much narrowed beyond the middle, and of normal width at apex; the median nervure is strongly curved caudad at or a little beyond the middle, almost touching the submedian nervure with which it runs nearly parallel for some distance and then curves forward again to meet the basal nervure. In *Spathius exarator* Linnæus, type of the genus, as well as in all of the other species known to me, the median nervure is practically straight or only slightly curved.

The three species thus far known from the Philippines can be separated as follows:

Key to species of Spathius from the Philippines.

1. Median nervure straight, the median cell not narrowed beyond the middle; propodeum with a complete and distinct areola; wings uniformly smoky; face transversely wrinkled..... *S. fuscipennis* Ashmead.
- Median nervure strongly curved, the median cell beyond the middle very much narrowed; propodeum without areolation; wings fuscous, contrastingly marked with hyaline spots or bands..... 2.
2. Face transversely wrinkled; vertex finely transversely striated; first transverse cubitus and the second abscissa of radius forming a straight line; first tergite not broader at apex than at base; second tergite very faintly longitudinally aciculated, almost smooth; suturiform articulation absent; temples narrower than the eyes.

S. philippensis Ashmead
Face not transversely wrinkled, but granularly punctate or coriaceous; vertex weakly reticulated and shining, without any transverse striae; first transverse cubitus forming a distinct angle with second abscissa of radius; first tergite distinctly broader at apex than at base; first, second, greater part of third, and base of fourth tergite distinctly and uniformly coriaceously punctate; suturiform articulation present and very finely striated; temples broader than the eyes.

S. dinoderi sp. nov.

Spathius dinoderi sp. nov. Plate 1, fig. 2.

Male.—Length, 3.2 millimeters. Head quadrate; face, including clypeus, uniformly granularly punctate, opaque; frons, vertex, temples, and cheeks weakly reticulated and shining; eyes small, elliptical, not quite as broad as temples; ocelli small, the postocellar line a little shorter than ocellocular line; antennæ very slender, as long as the body, 25-jointed in the type; mesoscutum weakly reticulated, somewhat shining, the posterior middle without longitudinal rugæ and the parapsidal grooves without foveæ; scutellum sculptured like mesoscutum, the transverse furrow at base weakly foveolated; propodeum as long as mesoscutum, nearly horizontal, uniformly reticulate-punctate, and opaque, without transverse or longitudinal carinæ; mesopleura, and metapleura weakly sculptured and shining; median nervure strongly curved, the median cell greatly narrowed beyond the middle; second abscissa of radius slightly longer than first intercubitus and forming an angle with it; recurrent nervure joining second cubital near the intercubitus; subdiscoideus interstitial; submediellan cell of hind wing small and narrow, the costal cell rather broad at apex; hind femora distinctly swollen and much shorter than their tibiæ, median and front femora also slightly

thickened; abdomen as long as head and thorax, the petiole a little broader at apex than at base, about half the length of remainder of abdomen; petiole above, second and third tergites (except apical border of the latter) and base of fourth tergite sculptured like the propodeum; remainder of abdomen nearly smooth with only very faint reticulation.

Head testaceous; antennæ pale testaceous with apex brownish; thorax, legs, and abdomen dark brownish testaceous, the mesonotum posteriorly, propodeum entirely, and the abdomen apically, more or less piceous; forewings strongly infuscated, with narrow base, transverse band at middle of costal nervure, a spot embracing base of stigma, a spot in radial cell behind apex of stigma, a spot surrounding the recurrent nervure, and a broad apical band hyaline; venation dark brown, the base of stigma pale; hind wings hyaline.

Female unknown.

Type locality.—Mount Maquiling, Luzon, Philippine Islands.

Type.—Catalogue No. 26758, United States National Museum.

Host.—*Dinoderus minutus* Fabricius.

Described from two males received from C. F. Baker under his Nos. 18618 and 18619, and said to have been reared from the above-mentioned host infesting bamboo. The male paratype is much smaller and lighter colored than the type but otherwise appears to be the same.

MICROGASTERINÆ

Apanteles angustibasis sp. nov.

Female.—Length, 1.75 millimeters. Head, as viewed from in front, a little broader than high, more convex above than below, the vertex strongly arched above the eyes while the ventral margin of head is nearly straight; cheeks short and not at all convex; vertex, frons, and temples smooth and impunctate; face shining but with very minute obscure punctures; antennæ short, about two-thirds as long as the body, the first flagellar joint about twice as long as broad, following joints shorter, those beyond the fifth subquadrate; mesoscutum somewhat shining, with suberased punctures, the punctures more distinct and more numerous anteriorly; scutellum impunctate; propodeum rugulose, subopaque, with a poorly defined areola and weak costulae, the areola mostly effaced anteriorly; pleura shining and sparsely punctate; first radial abscissa not quite perpendicular to the

front margin of wing, straight, arising at middle of stigma, joining first intercubitus at a distinct angle and distinctly longer than the intercubitus; abdomen as long as the thorax, flattened dorsally and not compressed, perfectly smooth and polished; first segment fully three times as long as broad, very narrow, and as broad at base as at apex, the sides parallel; ovipositor sheaths approximately one-third as long as abdomen, moderately slender and distinctly curved downward. Hind tibial spurs unequal, the inner and longest spur less than half as long as the metatarsus.

Black; antennal flagellum dark brownish testaceous; palpi yellowish; front and middle tibiae and tarsi, posterior trochanters, basal half of hind tibiae, and apices of hind tarsi testaceous; all coxae black; all femora, apical half of hind tibiae, and hind tarsi basally brownish black; membranous margins of first tergite more or less testaceous; ovipositor sheaths black; wings hyaline, the stigma uniformly pale brownish, veins paler than the stigma.

Type locality.—Mount Maquiling, Luzon, Philippine Islands.

Type.—Catalogue No. 26759, United States National Museum.

Host.—*Cnaphalocrocis medinalis* Guenée.

Described from one female specimen received from C. F. Baker under his No. 18623, and said to have been reared from the above-named host.

OPIINÆ

Opius lepidus sp. nov.

This species differs from *O. philippinensis* Ashmead as well as most of the other species of the genus by having the notaui complete and strongly foveolate. This character, combined with the fact that the ovipositor is scarcely at all exserted, the second tergite finely coriaceous, and the second abscissa of radius much longer than the first intercubitus, will distinguish the species from any of the described Oriental or Australian species of Opiinæ.

Female.—Length, 1.35 millimeters. Head strongly transverse, as viewed from above, appearing fully three times as broad as long, polished, impunctate; the face moderately hairy without distinct punctures and without a distinct median ridge; clypeus subtruncate anteriorly and forming with the mandibles a narrow transverse opening; antennæ 20-jointed, a little longer

than the body, and inserted distinctly above the middle of face and above the middle of the eyes. Thorax short and mostly polished; mesoscutum broader than long, moderately hairy and smooth, with the notauli complete, of an equal depth throughout, and strongly foveolate for their whole length; transverse suture basad of scutellum broad with three very distinct cross-carinæ; scutellum flat and polished; mesopleura shining, very faintly reticulate, the sternauli broad and with distinct transverse rugæ; propodeum with a strong transverse carina before the middle, dividing the segment into a short anterior or dorsal portion and a somewhat longer posterior portion, the anterior area rugosely sculptured with a short median carina, the posterior area more nearly smooth and more or less distinctly divided by longitudinal carinæ into six subequal areas; hind metatarsus about equal to the two following tarsal joints combined; forewing longer than the body; stigma lanceolate; radius originating from approximately the basal one-third of stigma and attaining the wing margin very slightly before the extreme wing apex; first radial abscissa shorter than half the width of stigma, second abscissa one and one-half times the first intercubitus; recurrent nervure joining second cubital cell; brachial cell completely closed; nervulus slightly postfurcal; abdomen ovate, as long as thorax and about as broad; first tergite slightly longer than broad, distinctly longitudinally rugulose except the posterior lateral angles which are narrowly depressed and smooth; coalesced second and third tergites coriaceously sculptured except a narrow apical margin, the suturiform articulation entirely effaced; fourth tergite polished and equal to approximately one-third the preceding; tergites beyond the fourth retracted and entirely concealed from above; ovipositor sheaths short, concealed from above or with only the extreme tip visible. Color very dark reddish testaceous, the head and abdomen a shade darker than the thorax; the abdomen, at least at apex, more or less piceous; antennal flagellum dark reddish brown, the scape and all legs slightly more yellowish than the thorax, wings hyaline, stigma and veins brownish.

Type locality.—Los Baños, Philippine Islands.

Type.—Catalogue No. 26760, United States National Museum.

Described from three females received from C. F. Baker under his No. 18879 and said to have been reared from galls on *Phyllanthus*.

ALYSIIDÆ

ALYSIINÆ

Phaenocarpa (Asobara) bactrocerae sp. nov. Plate 1, fig. 3.

This species runs straight to *Asobara* in Szepligeti's key to the genera of Alysiidæ¹ and resembles very closely *Asobara orientalis* Viereck² with the type of which it has been compared. The head of *orientalis* is darker than its mesoscutum and the mesoscutum is divided by a dark, apparently subtegumentary, median longitudinal line. In *bactrocerae* the head is distinctly paler than the mesoscutum and the latter is without a trace of the median longitudinal line. *Asobara antipoda* Ashmead, the type of which has not been seen, apparently differs from *bactrocerae* by having a longer ovipositor and in the black color of the thorax beneath and the abdomen.

Female.—Length, 2 millimeters. Head, thorax, and abdomen smooth and polished. Antennæ 26-jointed, nearly twice as long as the body, the third and fifth joints subequal and each about three-fourths the length of the fourth; mandibles with three apical teeth, the median tooth narrow at base, acute at apex and extending distinctly beyond the other two, both of which are short and broadly rounded or subtruncate at apex; occiput above and the vertex divided by a dark median longitudinal subtegumentary line which extends from the ocelli to the neck; mesoscutum with a small, round, deep, dimplelike median impression in front of the scutellum, the notauli impressed at the lateral anterior angles but almost effaced dorsally; disk of scutellum rectangular in outline, a little broader than long, the suture between it and the mesoscutum broad and divided medially by one longitudinal carina; propodeum polished with a narrow, parallel-sided, carinately bounded area at the middle, extending from the posterior margin of propodeum three-fourths of the distance to the anterior margin and connected with the anterior margin by a short median carina, the costulae absent; pleura smooth and polished, the sternauli weakly foveolate; forewing equal in length to the body, with rather long and moderately dense cilia; stigma rather small, thickest at the origin of radius; first radial abscissa distinct but equal to less than half the width of stigma in length; second radial abscissa long, equal to nearly twice the length of first intercubitus; second cubital cell narrowed

¹ Genera Insectorum, Braconidæ, Fasc. 22 (1904) 200.

² Proc. U. S. Nat. Mus. 44 (1913) 639.

slightly at apex, radial cell large, the third abscissa of radius more than twice as long as the second abscissa and reaching the wing margin at the extreme apex of wing; recurrent nervure joining the first cubital cell; nervulus interstitial or very nearly so; brachius entirely effaced, the brachial cell open behind; subdiscoideus interstitial with discoideus, effaced apically, the stub barely longer than the recurrent vein; abdomen a little longer than the thorax, smooth; first tergite one and one-half times as long as broad at apex, smooth and polished, elevated medially on the apical two-thirds, and with two longitudinal carinæ dorsally which originate one on each side at the lateral margin just anterior to the spiracle and extend in slightly converging lines to the apex of segment; ovipositor sheaths about one-third the length of the abdomen; ovipositor curved upward at apex. Head, scape, pedicel, prothorax, first tergite, and apex of abdomen beneath yellowish testaceous; thorax, except prothorax, and abdomen, except as noted, dark rufous approaching piceous; antennal flagellum dark reddish brown, the apical eight joints white; legs yellowish testaceous, the coxae slightly paler than the femora; ovipositor sheaths and wing veins dark brown; wings hyaline.

Male unknown.

Type locality.—Mount Maquiling, Luzon, Philippine Islands.

Type.—Catalogue No. 26761, United States National Museum.

Host.—*Bactrocera umbrosa* Fabricius.

Described from three females received from C. F. Baker and said by him to have been reared from the above-named fruit fly which commonly infests the jack fruit (*nangka*) in the Philippines. Baker further states in his letter of transmittal that the fly, while common, never does great damage on account of this parasite which may emerge in hundreds from one small infected portion of a fruit.

CHALCIDOIDEA

CALLIMOMIDÆ

PODAGRIONINÆ

Genus PODAGRION Spinola

The following key will help to distinguish the three species of this genus thus far known from the Philippines:

Key to species of Podagrion from the Philippines.

1. Propodeum with two distinct carinæ originating at the middle of anterior margin and diverging posteriorly to terminate at the posterior lateral angles 2.

Propodeum without such carinae; surface of propodeum irregularly rugose-reticulate; hind coxae slender; anterior and middle coxae, and the posterior pair except at base, pale yellowish.

P. ashmeadi Crawford.

2. Propodeum irregularly rugose-reticulate; ovipositor no longer than the body; head and thorax bluish black..... *P. philippensis* Crawford.

Propodeum with nearly uniform close thimblelike punctures; ovipositor distinctly longer than the body; head green; thorax blue or blackish, with only a faint greenish tinge..... *P. sinensis* (Walker).

Podagrion sinensis (Walker).

Four female specimens of what appears to be this species were received from C. F. Baker under his No. 18878. These specimens were taken at Manila, Philippine Islands, by Reverend Robert Brown and were turned over to Professor Baker when Father Brown left the Islands. The host is not known.

CHALCIDIDÆ

CHALCIDINÆ

Genus **BRACHYMERIA** Westwood

As pointed out by Gahan and Fagan,³ *Chalcis* Fabricius and *Smiera* Spinola have the same genotype and the name *Chalcis* Fabricius should be used for the group of species heretofore placed in *Smiera* Spinola (equals *Smicra* of authors). *Chalcis* of authors (not Fabricius) should take the name *Brachymeria* Westwood. In naming the following new species, *Brachymeria* is used in the sense of *Chalcis* of authors.

Brachymeria excarinata sp. nov.

The carina separating the face from the cheeks runs straight to the eye margin and is without the backward-directed branch present in most members of the genus. In this respect it agrees with *ovata* Say, but it differs from that species by lacking any suggestion of a tooth or tubercle on the underside of hind coxae, the abdomen is more acuminate at apex, and the sixth tergite is less coarsely sculptured. Both *hirtifrons* Ashmead and *prodeniae* Ashmead lack the carina on the cheek. The former differs from the new species by being far less coarsely punctate on the dorsum of thorax, the mesoscutum and scutellum being finely shagreened and shining with widely separated, small, round punctures; by having the first tergite distinctly finely and closely punctate; and by having the abdomen very blunt at

³ Bull. U. S. Nat. Mus. 124 (1923) 31.

apex. The species *prodeniae* is much smaller than the new species, its sixth tergite is not longer than the fifth and the hind tibiæ are almost entirely black.

Female.—Length, 4 millimeters. Occiput shagreened; vertex umbilically punctate; frons laterad of the antennal groove, face, cheeks, and temples rugulose; clypeus shining with a few shallow punctures; antennal groove polished within; antennal flagellum nearly the same thickness throughout; funicle joints subequal in length and quadrate, none of them transverse; pronotum above, mesoscutum, scutellum, and axillæ with close umbilicate punctures, the scutellum margined at apex but not bilobed; propodeum with coarse irregular rugose-reticulate sculpture; submarginal vein nearly two and one-half times as long as the marginal; postmarginal a little less than half as long as marginal; hind femora with nine small teeth on the ventral margin, the three nearest base of femora considerably broader but not much longer than those toward apex; abdomen as long as the thorax, pointed ovate, not bluntly rounded at apex as in many species; first tergite polished impunctate; second to fifth shining but weakly punctate or shagreened over most of their surfaces; sixth subopaquely shagreened but without coarse punctures, fully twice as long as the fifth tergite and about twice the length of seventh; tip of ovipositor barely showing.

Black; antennæ black, the apex of club brownish; tegulæ, small apical spot on all femora, front tibiæ outwardly for their whole length, middle tibiæ at base and apex, and incomplete broad band on hind tibiæ near base and another at apex, and all tarsi pale lemon yellowish, the apices of tarsi more or less brownish; venter of abdomen toward apex more or less brownish; wings hyaline, the venation dark brown.

Type locality.—Mount Maquiling, Luzon, Philippine Islands.

Type.—Catalogue No. 26762, United States National Museum.

Host.—*Cnaphalocrocis medinalis* Guenée.

Described from one female received from C. F. Baker under his No. 18621, and said to have been parasitic upon the above-named lepidopteron.

CLEONYMIDÆ

CLEONYMINÆ

Genus PYCNETRON novum

This genus apparently differs from all other cleonymid genera in the strongly compressed abdomen. In Schmiedeknecht's key

to the genera of Cleonyminæ⁴ it runs to *Anoglyphis* Foerster, but may be distinguished by the absence of a median carina on propodeum and by the presence of three ring joints in the antennæ, as well as by abdominal characters.

Head large, transverse, broader than the thorax, receding behind the eyes, the occiput not concave; ocelli in a very low triangle, almost in a line; viewed from in front the head is somewhat broader than high, subquadrate in outline with the cheeks rounded and the vertex a little convex; viewed from the side the head is only slightly convex in front; eyes ovate; malar space equal to nearly half the eye height, malar groove distinct; mandibles broad with four strong subequal teeth, the ventral tooth slightly the longest; face with converging striæ; antennæ inserted at middle of head, placed close together at base; antennal depression extending to the front ocellus, rather deep, parallel-sided, the sides rounded and immarginated; antennæ 13-jointed; scape straight, cylindrical, reaching to the front ocellus; pedicel longer than broad; three distinct ring joints; funicle 5-jointed, the first joint nearly twice as long as the pedicel, all joints cylindrical and longer than broad; club 3-jointed, not thicker than the funicle and about equal to the last two funicle joints combined; pronotum transverse, as broad as the mesonotum, perpendicularly truncate anteriorly, slightly shorter at the middle than at the sides and about one-third as long at the middle as the mesoscutum; parapsidal grooves complete; axillæ broadly separated; scutellum high, convex, about as broad as long, perpendicularly truncate at apex, with a transverse furrow just before the truncation so that the dorsal apex appears margined by a transverse carina; propodeum short with distinct lateral folds but without a median carina, the spiracles large and ellipsoidal; prepectal plate wedge-shaped and very small; legs normal, the anterior and posterior femora not especially swollen and not denticulate or excised beneath; hind tibiæ with two distinct unequal spurs; marginal vein about half as long as the submarginal, and not quite as long as the postmarginal; stigmal about one-third as long as marginal, gradually thickening from base to apex and with a short uncus; hind wing with the costal cell reaching to the hooklets; abdomen sessile, very strongly compressed, almost linear as viewed from above, distinctly longer than the head and thorax, conic-ovate in lateral view; seventh tergite tubular and as long as the three preceding tergites com-

⁴ *Genera Insectorum*, Fasc. 97 (1909) 154.

bined with its spiracles near the apex; ovipositor sheaths extending a little beyond apex of seventh tergite.

The male agrees with the female in every way except that the antennæ have two ring joints and a 6-jointed funicle, while the abdomen is no longer than thorax, not strongly compressed but slender and depressed or impressed above and keeled beneath, the seventh tergite shorter than sixth and not tubular but triangular.

Pyenetron curculionidis sp. nov. Plate 1, fig. 1.

Female.—Length, 5.6 millimeters. Head strongly reticulate and slightly shining, the cheeks a little less strongly reticulated, and the face from slightly below the antennæ with fine striæ which converge at the mouth; three antennal ring joints subequal and each approximately twice as broad as long; first funicle joint twice as long as broad, the following joints successively shortening, the fifth one and one-half times as long as broad; club joints not very distinct, the sutures fine and shallow; pronotum rugose; mesoscutum, axillæ, and scutellum with close thimblelike punctuation, opaque; propodeum finely reticulate, with deep lateral folds and another carinate fold mesad of and close to the spiracle; mesopleura closely punctate but with a perfectly smooth spot below the base of posterior wing; discal ciliation of forewing moderately coarse and uniform, the base of wing bare except that the costal cell is nearly uniformly ciliated and there is a small triangular patch of cilia behind the apex of submarginal vein; hind wing reaching only to the apex of stigmal vein, nearly uniformly ciliated but the ciliation weaker than that of forewing; first abdominal tergite incised at the middle, comprising about one-sixth of the length of abdomen, tergites 2 to 6 successively increasing slightly in length, the sixth about equal to the first; seventh twice as long as the sixth; all tergites shining but with very faint reticulation.

Color black; antennal scape and club reddish testaceous, rest of the antennæ brownish black; all tarsi pale testaceous; all tibiæ brownish testaceous, the femora brownish black; coxæ bluish black; abdomen brownish testaceous beneath, black above with a faint metallic luster; ovipositor sheaths black; wings hyaline.

Male.—Length, 4.2 millimeters. Similar in every way to the female, except for the characters given in the description of the genus and the fact that the first funicle joint is somewhat less than twice as long as thick, the club is testaceous only at the

extreme apex, the femora are perhaps a little darker, and the abdomen is brownish testaceous only at base beneath.

Type locality.—Mount Maquiling, Luzon, Philippine Islands.

Type.—Catalogue No. 26763, United States National Museum.

Host.—*Acicnemis filicornis* Hubenthal.

Described from one female and one male received from C. F. Baker under his No. 18871, and said to have been parasitic upon the above-named curculionid.

EUPELMIDÆ

Metapelma atrotularis sp. nov.

This may be *M. rufimana* Westwood, described from Borneo, but differs from the description of that species by being somewhat larger, with the oviduct very slightly more than half as long as the abdomen, and the fifth antennal joint not perceptibly shorter than the fourth. Westwood does not describe the antennal characters except by inference in comparing with *gloriosa* Westwood.

Female.—Length, 8 millimeters; ovipositor, 4.3. Vertex weakly shagreened and with scattered punctures; frons finely shagreened with the punctures much closer than on the vertex, sericeous; face rugulose-punctate and like the frons sericeous; eyes converging above and moderately hairy; head behind the eyes less strongly sculptured than the face; ocelli in a nearly equilateral triangle, postocellar line somewhat longer than ocellocular, the latter approximately equal to the diameter of an ocellus or only a trifle shorter; antennal scape thickened toward apex; pedicel about one and one-half times as long as the first funicle joint, the latter approximately twice as long as thick; second funicle joint distinctly much longer than pedicel and first funicle joint combined, equal to the scape; third funicle joint equal to the second (following antennal joints missing); prothorax and mesothorax sericeous, finely and nearly uniformly shagreened above and below; the mesepisternum above nearly destitute of pile and finely longitudinally lineolate along the dorsal margin posteriorly; mesonotum rather shallowly depressed, the lateral ridges with a distinct carinate line or fold running the full length; axillæ meeting, not strongly sculptured; scutellum approximately one and one-half times as long as broad, strongly margined laterally, and faintly margined at apex, sides parallel; metanotum with a median, triangular, flattened process extending posteriorly to the middle of propodeum; propodeum weakly sha-

greened, without carinæ, the spiracles large and circular; middle legs long and slender, the basal joint of their tarsi not much thickened and rather weakly spined beneath; middle tibiæ spurs as long as basal joint of tarsi; hind tibiæ compressed and expanded behind, the expansion extending from near base to apex and at its broadest point about as wide as the tibia, broadest near the middle; wings reaching beyond apex of abdomen; marginal vein much shorter than submarginal, about four times as long as stigmal; postmarginal distinctly longer than marginal; abdomen conic-cylindrical, slightly compressed, about equal to thorax in length but not as broad as thorax, the basal tergite emarginate at apex; ovipositor exserted very slightly more than the length of abdomen. Head metallic green tinged with cupreous on middle of frons; an area surrounding the ocelli and the lower part of frons bluish; mandibles brown, their apices black; antennal scape metallic beneath, black above; flagellum black; thorax aëneo-cæruleous variegated with purple, black, and cupreous; pronotum and mesonotum dark aëneous, the middle of scutum more greenish; axillæ blue-green; scutellum purplish black; propodeum bright brassy green; thorax beneath and all coxae bright metallic blue-green with strong purplish reflections on the pleura; abdomen purplish black, the tergites laterally, except the last, with a large area bright metallic green; wings distinctly infuscated from the stigmal vein to apex, subhyaline basad of stigmal vein; tegulæ dark aëneous, nearly black; anterior and median legs except coxae rufous; the median tarsi blackish, more or less rufous at base; hind femora black, the basal fourth more or less rufous, and extreme apex white; hind tibiæ black with a white band at base; metatarsus black on basal three-fourths, apical fourth and following joints white; ovipositor sheaths black.

Type locality.—Dapitan, Mindanao, Philippine Islands.

Type.—Catalogue No. 26764, United States National Museum.

Described from one female received from C. F. Baker under his No. 13898.

Metapelma tenuicerus sp. nov.

This can be distinguished from other species known to me by the narrow lamellæ of hind tibiæ.

Female.—Length, 5.2 millimeters; ovipositor, 4.8. Antennal scape club-shaped; pedicel not quite one and one-half times as long as first funicle joint; second and third funicle joints nearly equal in length and each about as long as the scape; fourth funicle joint a little more than half as long as third; following

joints of funicle gradually shorter; club approximately twice as long as thick at base, obliquely truncate; postocellar line very slightly longer than the ocellocular; pronotum and mesoscutum very weakly reticulately sculptured; lateral ridges of mesoscutum each with a weak carinate line or fold extending their full length; scutellum a little more than one and one-half times as long as broad, distinctly margined laterally and more delicately so at apex; mesopleura a little more strongly sculptured than mesoscutum; median process on the metanotum not extending to the middle of propodeum; spur of middle tibia a little shorter than the basitarsus; hind tibiæ compressed but the lamellæ very narrow, originating at about basal one-sixth and extending to apex and at no point as broad as the thickened portion of tibiæ.

Vertex and greater part of frons dark cupreous; ocellar triangle, lower part of frons, and most of face bluish green; cheeks and posterior part of head brassy green; pronotum and mesoscutum bright coppery, a little darker laterally; axillæ green; scutellum and metanotum bluish black; propodeum coppery; underside of thorax and the coxæ bright metallic green, the mesopleura more or less blue and purplish anteriorly and along the dorsal margin; abdomen blackish with the sides more or less strongly tinged with coppery; fore and median legs including their tarsi mostly rufous; hind femora black except a very narrow white band at extreme apex; hind tibiæ black with a very narrow white band at base; basal two-thirds of hind basitarsus black, the remainder of tarsi white.

Otherwise agrees with the description of *atrotectorialis*.

Type locality.—Iligan, Mindanao, Philippine Islands.

Type.—Catalogue No. 26765, United States National Museum.

Described from a single female specimen received from C. F. Baker under his No. 13902.

Metapelma speciosa sp. nov.

Apparently close to *M. rufimana* Westwood but larger and with the middle tarsi black, white at base, the tegulæ whitish, and the ovipositor more than half the length of body. Differs from *albisquamulata* Enderlein in the color of the hind femora and also in having the thorax distinctly finely sculptured.

Female.—Length of body, 9.5 millimeters; ovipositor, 7. Postocellar line distinctly longer than the ocellocular line; antennal pedicel only slightly longer than first funicle joint; second funicle joint distinctly, though not a great deal, longer than the

scape and fully twice as long as pedicel and first funicle joint combined; third funicle joint equal to scape; fourth joint of funicle approximately half the length of third; following joints gradually diminishing in length outwardly; club short and obliquely truncate, indistinctly 3-jointed; mesoscutum moderately depressed medially, the lateral ridges each with a fine carinate line running their whole length; middle tibial spurs not quite as long as the basal joint of tarsi; expansion of hind tibia extending from near base to apex, broadest beyond the middle, the lamella or flange at its broadest point fully twice as broad as the tibia itself; abdomen a little longer than the thorax; ovipositor exserted the length of thorax and abdomen. Head metallic green; spot on vertex and two oval spots, contiguous anteriorly, on the middle of the frons cupreous; antennal scape blackish above, fulvous beneath; proscutum and mesoscutum and scutellum purplish black, middle of mesoscutum greenish; underside of thorax metallic green, the mesopleura above purplish; axillæ blue-green; propodeum bright green; middle tarsi pale at base; hind femora at base beneath rufous; tegulæ yellowish white; abdomen blackish, spotted with metallic green laterally. Otherwise agrees with the above description of *atrotegularis*.

Type locality.—Dapitan, Mindanao, Philippine Islands.

Type.—Catalogue No. 26766, United States National Museum.

Described from one female specimen received from C. F. Baker under his No. 13900.

Oodera ornata sp. nov.

This beautiful species resembles very closely *O. gracilis* as described and figured by Westwood⁵ but can be distinguished from that species at once by the much shorter ovipositor and the differently colored legs. From *rufimana* Westwood it differs by having the head metallic green instead of black, the face brilliant brassy green, and the ovipositor is apparently somewhat shorter. It is much larger than *obscura* Westwood and not wholly obscure aëneous as that species is said to be.

Female.—Length, 10 millimeters; ovipositor, 1.6. Head nearly circular as viewed from in front; face coarsely irregularly rugose-striate, the rugæ curving from the eye margins and converging toward the mouth; eyes converging above; vertex narrow; ocelli rather small, in an acute triangle, the posterior

⁵ Thesaur. Entom. Oxon. (1874) 145, pl. 27, fig. 9.

pair separated by approximately the diameter of an ocellus and nearer to the eye margin than to each other; antennal grooves deep, separated at base by a broad triangular rugose-punctate plate, confluent above; area between the antennal groove and eye margin above the middle of frons narrow, elevated, with six or seven large punctures on the crest of the elevation causing it to appear crisplate; antennal flagellum thickest at the middle, tapering slightly toward base and apex; scape slightly thickened beyond the middle, curved, and reaching to the front ocellus; pedicel about two and one-half times as long as thick and about three-fourths as long as first funicle joint; second funicle joint the longest, one and one-half times the first; following joints rapidly diminishing in length, the last joint conical and a little longer than penultimate; pronotum finely transversely wrinkled above, with fine curving longitudinal striæ laterally; metallic-colored portion of the mesonotum rugose-punctate, blackish portion finely transversely rugulose; anterior half of axillæ rugose-punctate, posterior half weakly irregularly rugulose; scutellum a little broader than long, regularly rounded posteriorly, distinctly and completely margined laterally and posteriorly, rather coarsely longitudinally rugose-striate, the groove at base angled in the middle and distinctly foveolate; propodeum coarsely rugose dorsally, strongly rugose-punctate on the sides; underside of thorax for the most part rugose-punctate, the mesepimeron immediately beneath the wings more weakly sculptured, lineolate; anterior femora greatly swollen, with a comblike row of short stiff erect spines along the ventral margin, a narrow patch of closely set recumbent black setæ paralleling this row outwardly and close to it, and a broad elliptical patch of the same kind of setæ on the inner surface proximad of the middle; middle tibial spur about half the length of first tarsal joint, the latter very slightly thickened with rather weak spines beneath, these spines not black but concolorous with the tarsal joint; hind legs slender with two tibial spurs; abdomen fusiform, narrower than the thorax, pointed at apex, the apical margins of tergites 1 to 5 emarginate medially, each tergite except the last with a finely sculptured metallic-colored area laterally, otherwise nearly smooth or very faintly reticulate. Marginal and postmarginal veins subequal, the marginal very slightly the longest, together equal to the submarginal; stigmal vein approximately one-third the length of postmarginal. Antennæ black, scape metallic; entire head metallic green, the face brilliant brassy green; prothorax blue-green above; mesonotum

blue-green anteriorly and laterally, the posterior two-thirds, except lateral margins, dull black with a faint reddish tinge in some lights; anterior half of axillæ blue-green, posterior half dull black; scutellum metallic green basally, the posterior two-thirds purplish black; tegulæ brownish black; propodeum bright metallic green; whole underside of thorax and all coxæ beautiful deep purple or dark greenish blue, the mesepimeron more or less brassy green; fore and median legs except coxæ mostly obscurely reddish testaceous, the front femora with a metallic blotch above toward apex and the setæ on ventral margins black; middle tibiæ more or less piceous; hind femora, tibiæ, and tarsi mostly piceous, their trochanters, base and apex of femora, and apex of tibiæ reddish; wings faintly fuscous, the infuscation strongest in the middle of forewing.

Type locality.—Davao, Mindanao, Philippine Islands.

Type.—Catalogue No. 26767, United States National Museum.

Type and a female paratype from Davao, Mindanao; also two female paratypes from Sandakan, Borneo. All collected by C. F. Baker.

This species is rather variable in size. The paratype from Mindanao is fully 12 millimeters in length while one of the paratypes from Borneo is barely 7 millimeters long. Otherwise all appear to be exactly alike.

ENCYRTIDÆ

ENCYRTINÆ

Encyrtus barbatus Timberlake.

One female of this species, received from C. F. Baker and bearing his No. 19729, was taken on Basilan Island, in the Philippines. The host is not indicated.

PTEROMALIDÆ

PTEROMALINÆ

Pteromalus luzonensis sp. nov.

Female.—Length, 2.5 millimeters. Like the well-known *P. puparum* Linnæus, except that the mesoscutum is not trilobed anteriorly, the parapsidal grooves being almost entirely effaced; the punctures of mesoscutum and scutellum are slightly larger and deeper, giving a more rugose and more opaque appearance; the mesoscutum is more transverse, being a little shorter, or at least not longer, than the scutellum; the scutellum is sculptured alike all over with very faint indication of a transverse furrow

before apex (quite distinct, though shallow and narrow in one paratype); the propodeal neck is distinctly margined at the sides by continuation of the lateral folds; the abdomen is somewhat broader than the thorax; head and thorax deep black or blue-black without any of the metallic green or brassy reflections of *puparum*; abdomen polished black with the first tergite steel blue and the other tergites giving off bluish or purplish reflections in some lights. Otherwise indistinguishable from *puparum*.

Type locality.—Mount Maquiling, Luzon, Philippine Islands.

Type.—Catalogue No. 26768, United States National Museum.

Described from four female specimens received from C. F. Baker under his No. 19728, and said to have been reared from the pupa of *Papilio* sp.

SPALANGIINÆ

Cerocephala (*Parasciatheras*) *dinoderi* sp. nov.

This agrees very well with the description of *P. caelebs* Masi except that it is the opposite sex. It is not improbable that the two will prove to be the same, but owing to the widely separated type localities and the fact that Masi's species is known only from a unique male while the present form is represented by a single female it is deemed best to give the Philippine form a different name until the identity of the two can be more firmly established.

Female.—Length, 2 millimeters; ovipositor, 0.4. Head viewed from in front about as long as broad, the cheeks rounded and the vertex convex; face below antennæ striate, the striæ converging at the clypeus; longitudinal ridge between the antennæ distinct and surmounted by a delicate carina; remainder of head perfectly smooth and polished; ocelli in a slightly obtuse triangle, the ocellocular line subequal to the distance from a lateral ocellus to the front ocellus, the postocellar line somewhat longer; occiput delicately margined; antennæ inserted about on a line with the lower extremities of the eyes; scape slender at base, the apical two-thirds distinctly thicker and subcylindrical; pedicel a little longer than broad and very slightly longer than the first funicle joint; funicle 6-jointed, the joints distinct and gradually thickening toward the apex; first funicle joint the smallest, very slightly longer than broad; second to sixth subequal in length but successively increasing in thickness, the second a little longer than broad, the sixth a little broader than long; club conic-

ovate, not thicker than the last funicle joint, about as long as the three preceding funicle joints combined and indistinctly 3-jointed, the sutures subobsolete; pronotum slightly longer than the mesoscutum, rounded in front and perfectly smooth, except the neck which is finely rugulose; mesonotum trilobed and polished, impunctate, the parapsidal grooves deeply impressed and strongly curved off laterally, the parapsides short; scutellum and axillæ smooth and polished, the scutellum flat, about as broad as long down the middle and broadly rounded at apex; axillæ distinctly separated and set off from the scutellum by complete foveolate grooves; propodeum finely rugulose, opaque, without either folds or carinæ; mesopleura anteriorly distinctly sculptured, posteriorly practically smooth; metapleura polished; forewing with the marginal and submarginal veins subequal; stigmal approximately one-fifth as long as the marginal, not thickened at apex; postmarginal a little shorter and slenderer than the stigmal; postmarginal and marginal veins with about thirty marginal bristles and a conspicuous tuft of black bristles at the junction of submarginal with marginal; discal ciliation subobsolete; marginal cilia moderately long and terminating at the posterior apical portion of the wing; on the underside of the venation at the junction of stigmal and marginal veins there are about six or seven long hairs; marginellan vein of hind wings longer than the submarginellan, the marginal cilia present along the entire posterior margin; abdomen a little shorter than the head and thorax, strongly petiolate, elliptical in outline; petiole as long as the hind coxæ, distinctly rugulose-punctate; rest of the abdomen perfectly smooth and polished; second tergite deeply emarginate medially; ovipositor sheaths a little longer than the petiole.

Head piceous above, face and cheeks brownish testaceous; antennal scape and all funicle joints concolorous with the face; club blackish; pronotum anteriorly and laterally, propleura, mesopleura, sternum, metapleura, and legs including all coxæ dark reddish testaceous, the mesopleura stained with blackish medially; posterior middle of pronotum, mesonotum, axillæ, scutellum, and abdomen, except the petiole, black; propodeum dark brownish above, reddish testaceous laterally and at apex; abdominal petiole brownish on basal half, testaceous apically; ovipositor sheaths testaceous with the apical one-third black; wings hyaline, with a yellowish cloud extending from the stigmal vein to or nearly to the posterior margin of the wing.

Male unknown.

Type locality.—Mount Maquiling, Luzon, Philippine Islands.

Type.—Catalogue No. 26769, United States National Museum.

Host.—*Dinoderus minutus* Fabricius.

Described from a single female specimen received from C. F. Baker under his No. 18617, with the above-cited locality and host record.

ELASMIDÆ

Elasmus philippensis Ashmead.

Two specimens, said to have been reared from *Erionota thrax* Fabricius at Manila, Philippine Islands, by Reverend Robert Brown, received from C. F. Baker under his No. 18624.

EULOPHIDÆ

ENTEDONINÆ

Pleurotropis fraternus (Motschulsky).

This species can be recognized by the unusually short antennæ, the whole appendage being barely longer than the height of head. The three funicle joints combined are subequal to the scape in length, the first funicle joint subquadrate and the second and third broader than long, while the club is pointed ovate with the basal joint subquadrate, the second shorter and narrower than the basal joint and terminating in an apical spine which is as long as the second joint.

Three female specimens received from C. F. Baker under his No. 18875, and said to have been taken at Manila, Philippine Islands, by Reverend Robert Brown.

Tetrastichus clypeatus sp. nov.

Easily distinguished from other described species of *Tetrastichus* from the Philippine Islands by its nonmetallic coloration. The color combined with the very distinct median groove on the mesoscutum, the rather long antenna with its first funicle joint longer than the pedicel, the very short propodeum, and the distinctly bidentate clypeus will, it is believed, distinguish the species from any of the recorded species from the Oriental Region.

Female.—Length, 2.3 millimeters. Head viewed from in front a little broader than high, very finely and obscurely reticulated; malar space equal to half the height of eye; anterior margin of clypeus distinctly bidentate, the teeth small and rounded at apex; antennæ inserted almost on a line with the

lower extremities of the eyes, almost twice as long as the dorsoventral aspect of head; scape reaching to the front ocellus; pedicel a little more than as long as thick at apex and a little less than four-fifths the length of first funicle joint; ring joints small and apparently four in number; first and second funicle joints equal and each fully two and one-half times as long as thick; third funicle joint barely shorter than the second; club equal in length to the two preceding funicle joints, scarcely thicker than the funicle, distinctly 3-jointed, the first and second joints equal, the third slightly shorter, conical, and terminating in a short spine. Thorax above very finely lineolate-reticulate; prescutum with a distinct median longitudinal groove and a row of four or five large, shallow, not very distinct punctures on each side paralleling and close to the parapsidal grooves; scutellum broader than long, evenly rounded behind with the dorsal as well as the two lateral grooves unusually distinct; propodeum weakly sculptured and medially very short, the anterior and posterior margins at the middle almost contiguous, longer laterally; on each side of the middle and extending obliquely from the posterior lateral angles to a point on the anterior margin of the propodeum about halfway between the middle and the spiracle is a carina which sets off a triangular area inclosing the spiracle; forewings ample; marginal vein longer than the submarginal and approximately five times the stigmal; submarginal with five or six bristles on its upper surface; spurs of the middle and hind tibiæ each as long as their basitarsi; abdomen nearly one and one-half times as long as the head and thorax combined, conic-ovate, tapering evenly from second tergite, uniformly but weakly sculptured, the first tergite not long, the second to sixth tergites subequal, the seventh somewhat longer than the sixth. Color of head, pronotum, mesoscutum, scutellum, large part of first tergite dorsally, and a spot at base of seventh tergite fusco-testaceous; thoracic pleura, propodeum, and the abdomen, except as noted, pitchy black; antennal scape and pedicel testaceous, the flagellum blackish; wings hyaline, veins fuscous; legs fusco-testaceous, their coxæ more or less piceous.

Male unknown.

Type locality.—Mount Maquiling, Luzon, Philippine Islands.

Type.—Catalogue No. 26770, United States National Museum.

Described from a single female specimen received from C. F. Baker under his No. 18873, and said to have been reared from the remarkable psyllid *Dynopsis robusta* Crawford.

SERPHOIDEA

SCELIONIDÆ

TELENOMINÆ

Prophanurus flavigonus sp. nov.

This strikingly colored species, known only from the male sex, and said to have been reared from an unknown coccid, apparently runs to *Prophanurus* in J. J. Kieffer's key to the genera of Telenominæ⁸ and agrees with the characterization of the genus. It is possible that the species is the *coccivorus* of Mayr, the male of which is insufficiently described.

Male.—Length, 0.7 millimeter. Head strongly transverse, broadly emarginate, smooth and polished, the face laterad of base of antennæ faintly reticulated; ocelli nearly in a straight line; temples very narrow; antennæ 12-jointed, not or only very slightly thickened apically; first three joints of the flagellum subequal, very slightly longer than broad and not pedunculated; following joints, except the last, broader than long and very shortly pedunculated at base; last joint ovate; mesoscutum weakly sculptured and hairy; scutellum smooth or very nearly so; forewing with moderately long marginal cilia, the longest approximately equal to one-fourth the wing breadth; stigmal vein longer than marginal and approximately half as long as postmarginal; marginal cilia of hind wing equal to the width of wing; abdomen shorter than the thorax, about one-third longer than broad and perfectly smooth, the suture between first and second tergites with a few very weak foveæ.

Head, thorax, and legs pale reddish testaceous; antennæ testaceous, the three or four apical joints usually very slightly infuscated; eyes and ocelli blackish; abdomen uniformly brownish black; wings hyaline, the venation pale.

Type locality.—Los Baños, Luzon, Philippine Islands.

Type.—Catalogue No. 26771, United States National Museum.

Described from five male specimens received from C. F. Baker under his No. 18876, and said to have been reared from an unknown coccid.

Prophanurus pacificus sp. nov.

Characterized by having the mesonotum unusually weakly punctate and shining, the head broader than the thorax and

⁸ Spec. Hymenop. Eur. et Alg. 11 (1912) 7.

broadly concave behind, the first funicle joint shorter than the pedicel, and the legs testaceous.

Female.—Length, 0.92 millimeter. Head strongly transverse, broader than thorax at tegulae, broadly emarginate behind; vertex weakly margined posteriorly, mostly polished but with very faint reticulation laterad of the front ocellus; frons perfectly smooth, a small area near the lower extremity of eyes very faintly reticulated; eyes hairy; antennae 11-jointed; pedicel about twice as long as broad; first flagellar joint a little shorter than pedicel and not quite twice as broad as long; joints 2 and 3 successively a little shorter than joint 1; joint 4 subquadrate; club 5-jointed, the joints except the last a little broader than long; thorax ovoid, longer than broad; mesoscutum and scutellum hairy, the former weakly punctate and somewhat shining, the latter polished; pleura without sculpture; stigmal vein long, slightly thickened at apex; marginal cilia at posterior apical angle of wing about one-seventh as long as the wing is broad; cilia along the submarginal vein distinctly longer than elsewhere on the margin; marginal cilia of hind wing not quite as long as the breadth of wing; abdomen as long and as broad as thorax, ovate, rounded at apex; first tergite striate from base to apex, much broader than long; second tergite distinctly striate at base in the suture and with the striae at the middle extended posteriorly as very faint aciculations to near the middle of tergite; remainder of abdomen polished. Black; antennal flagellum brownish black; scape and legs including coxae brownish testaceous, the front coxae usually piceous; wings hyaline.

Type locality.—Los Baños, Luzon, Philippine Islands.

Type.—Catalogue No. 26772, United States National Museum.

Described from four females received from Anastasio A. Rowan through H. E. Woodworth, and said to have been reared from eggs of an hemipterous insect infesting the rice plant.

Genus PHANURUS Thomson

J. J. Kieffer¹ has treated this genus as a synonym of *Telenomus* Haliday, thus following in the footsteps of G. Mayr.² At the same time Kieffer proposed several new genera, separated from *Telenomus* and from each other largely upon such

¹ Spec. Hymen. Eur. et Alg. 11 (1912) 23.

² Verh. Zool. bot. Ges. Wien 29 (1879) 697.

characters as whether the eyes are pilose or glabrous, whether the abdomen is smooth or striated at base, whether the frons is smooth or rugose, and upon the number of joints in the antennal club. Such differences as these are of doubtful value as generic characters. To one who has worked with the group, even casually, it is apparent that there are all stages and degrees of striation of the first and second segments of the abdomen, as well as a wide range in the sculpture of the frons. The number of joints in the antennal club is variable and very likely to be misconstrued, and can apply to but one sex at best.

As recognized by Ashmead, the genus *Phanurus* offers as good characters for separation from *Telenomus* as do those used by Kieffer for his segregates. The genotype *P. angustatus* has not been seen by me, but Thomson's description of the species leaves little doubt that it is of the same conformation as *P. ovivorus* Ashmead, *tabanivorus* Ashmead, *floridanus* Ashmead, *flavipes* Ashmead, and *emersoni* Girault. *Telenomus tabani* Mayr belongs to this group, as do also *T. benefactor* Crawford, *kingi* Crawford, and *gowdeyi* Crawford.

The above-named species are characterized by having the head not or rarely broader than the thorax, rarely more than two and one-half times as broad as long, more or less convex in front and usually not broadly emarginate behind; vertex and temples rounded off and not abruptly truncate, eyes not attaining the posterior margin of head above; abdomen of the female as long as or longer than the head and thorax, not broader than the thorax, pointed at apex, not truncate, the ovipositor usually more or less prominently exserted. The eyes are pilose, frons mostly smooth, parapsidal grooves absent, and the abdomen may be entirely smooth or the first tergite and base of the second may be striated. Other characters are as in *Telenomus* Haliday.

I am of the opinion that several of the present segregates from *Telenomus* will eventually have to be recombined with that genus, but for the present *Phanurus* appears to be as worthy of recognition as do some of the others, and the name is accordingly restored.

Phanurus rowani sp. nov.

Female.—Length, 0.8 millimeter. Head viewed from above transverse, as broad as thorax, convex in front, slightly emarginate behind, about two and one-half times as wide as long; angle formed by vertex and occiput slightly rounded, not sharply

defined; occipital carina weak and slightly below the vertex; eyes not attaining the posterior margin of head above; temples distinct, approximately one-third as wide as eyes and more or less rounded; vertex very faintly reticulated, remainder of head smooth; ocelli small, in a low triangle; viewed from in front the head is broader than high; antennæ 11-jointed; pedicel less than twice as long as broad, longer than first flagellar joint which is very slightly longer than broad; joints 2 and 3 of funicle subequal and subquadrate, 4 a little broader than long; club usually 5-jointed, although frequently with the first joint scarcely larger than a funicle joint and always smaller than the other club joints; joints 2, 3, and 4 of club subequal and subquadrate, the fifth or apical joint conic-ovate and barely longer than the others; thorax as broad as long, nearly circular in outline as viewed from above; mesoscutum very weakly sculptured, shining and sparsely clothed with short pubescence; scutellum polished; mesopleura mostly smooth; forewings rather narrow, the longest hairs of marginal fringe one-third to one-half as long as the breadth of wing; stigmal vein rather short and terminating in a very small rounded knob; marginal fringe of hind wing as long as the wing is broad; abdomen lanceolate, one-third longer than head and thorax, narrower than thorax, entirely smooth and polished except that the suture between first and second tergites is finely foveolated; first tergite transverse, usually with a low transverse ridge before the apex; second tergite longer than all of the following tergites combined; ovipositor exserted, the exserted portion variable in length, one-third as long as the abdomen in the type. Black; scape and all legs, including their coxae, testaceous; front coxae somewhat fuscous; pedicel and funicle joints brownish; wings hyaline.

In some specimens the abdomen is not much longer than the head and thorax. The exserted portion of the ovipositor varies in length from nothing at all to half as long as the abdomen, the sheaths as well as the ovipositor apparently being capable of complete retraction within the abdomen and the degree of exertion depending upon the position at the moment of death of the individual insect. The width of the forewing is also variable, being equal to scarcely more than twice the length of the longest marginal cilia in some specimens, while in others it is equal to approximately four times the longest cilia.

Male.—Length, .7 millimeter. Head viewed from above about twice as broad as long, temples more than half as wide as the eyes, frons along the eye margins very faintly reticulated;

antennæ 12-jointed; scape subcylindrical, thickened throughout its whole length, distinctly thicker than the pedicel and flagellar joints; pedicel a little longer than broad and very slightly longer than first flagellar joint; joints 1, 2, and 3 of the flagellum thicker than the following joints which are small and moniliform; apical joint about twice as long as broad; legs a little less slender than in the female, the front tibiæ especially somewhat swollen; hind metatarsus thicker than the following joints, the tarsi tapering toward apex; abdomen about as long as thorax and narrower than the thorax; first tergite apparently lacking the transverse ridge or it is very weak; foveolation of first abdominal suture very weak.

Vertex, mesonotum, scutellum, and abdomen above and below dark brown; antennæ brownish at apex; rest of body, legs, and antennæ reddish testaceous; wings hyaline.

Type locality.—Los Baños, Luzon, Philippine Islands.

Type.—Catalogue No. 26773, United States National Museum.

Host.—*Schoenobius incertellus* Walker.

Forty females and thirteen males received from Anastasio Rowan, student at the University of the Philippines, said to have been reared from eggs of the above-mentioned rice-stem borer. Named for the collector.

***Phanurus dignus* sp. nov.**

Very similar in general appearance to *rowani* sp. nov., but the female can be distinguished by the striated first tergite and the shorter abdomen which is not longer than the head and thorax and about as broad as the thorax. The males are distinguished at once by the black head and thorax and the non-thickened scape.

Female.—Length, 0.74 millimeter. Head viewed from above about twice as broad as long, convex in front and only slightly concave behind, the occipital carina delicate and situated below the vertex, vertex not abruptly truncate behind, temples distinct, vertex and a small area on inner orbit near lower extremity of the eye weakly sculptured, remainder of head smooth; eyes pilose; antennæ 11-jointed; pedicel about twice as long as broad; first flagellar joint longer than broad but distinctly shorter and narrower than the pedicel; joints 2 and 3 about as broad as long, 4 and 5 slightly transverse, joint 4 smaller than joint 5; club 4-jointed, the joints subquadrate and subequal, the apical joint short-ovate; thorax barely longer than broad; mesoscutum weakly reticulated and somewhat shining; scutellum polished;

longest marginal cilia of forewing about equal to one-fourth the wing breadth; marginal cilia of hind wing equal to the width of blade; abdomen as long as head and thorax, lanceolate, the first tergite transverse and distinctly longitudinally striated except at apex which is smooth, suture between first and second tergites foveolated, remainder of abdomen polished; ovipositor exserted approximately one-half the length of abdomen.

Black; legs including middle and hind coxae pale testaceous, the front coxae piceous; antennae black or brownish black, the base of scape more or less testaceous; wings hyaline.

Male.—Length, 0.7 millimeter. Antennæ 12-jointed; scape slender, not thickened; pedicel barely longer than broad and scarcely longer than first flagellar joint; first three flagellar joints as thick as the pedicel and each a little longer than broad, very slightly thicker than the following which are moniliform, the apical joint ovate and twice as long as broad; abdomen no longer than the thorax and a little narrower, subovate, the apex not truncate; legs slender.

Black; antennal flagellum brownish apically; scape, pedicel, and greater part of flagellum as well as the legs, except front coxae, pale testaceous; wings hyaline.

Other characters as in the female.

Type locality.—Los Baños, Luzon, Philippine Islands.

Type.—Catalogue No. 26774, United States National Museum.

Host.—*Schoenobius incertellus* Walker.

Eight females and thirteen males received from Anastasio Rowan, said to have been reared from eggs of the above-named rice-stem borer.

These specimens were received with the types of *rowani* sp. nov., described here, and the females are easily confused with that species unless particular attention is paid to the shape of the abdomen and the sculpture of the first tergite. The males are more easily distinguished.

CERAPHRONIDÆ

CERAPHRONINÆ

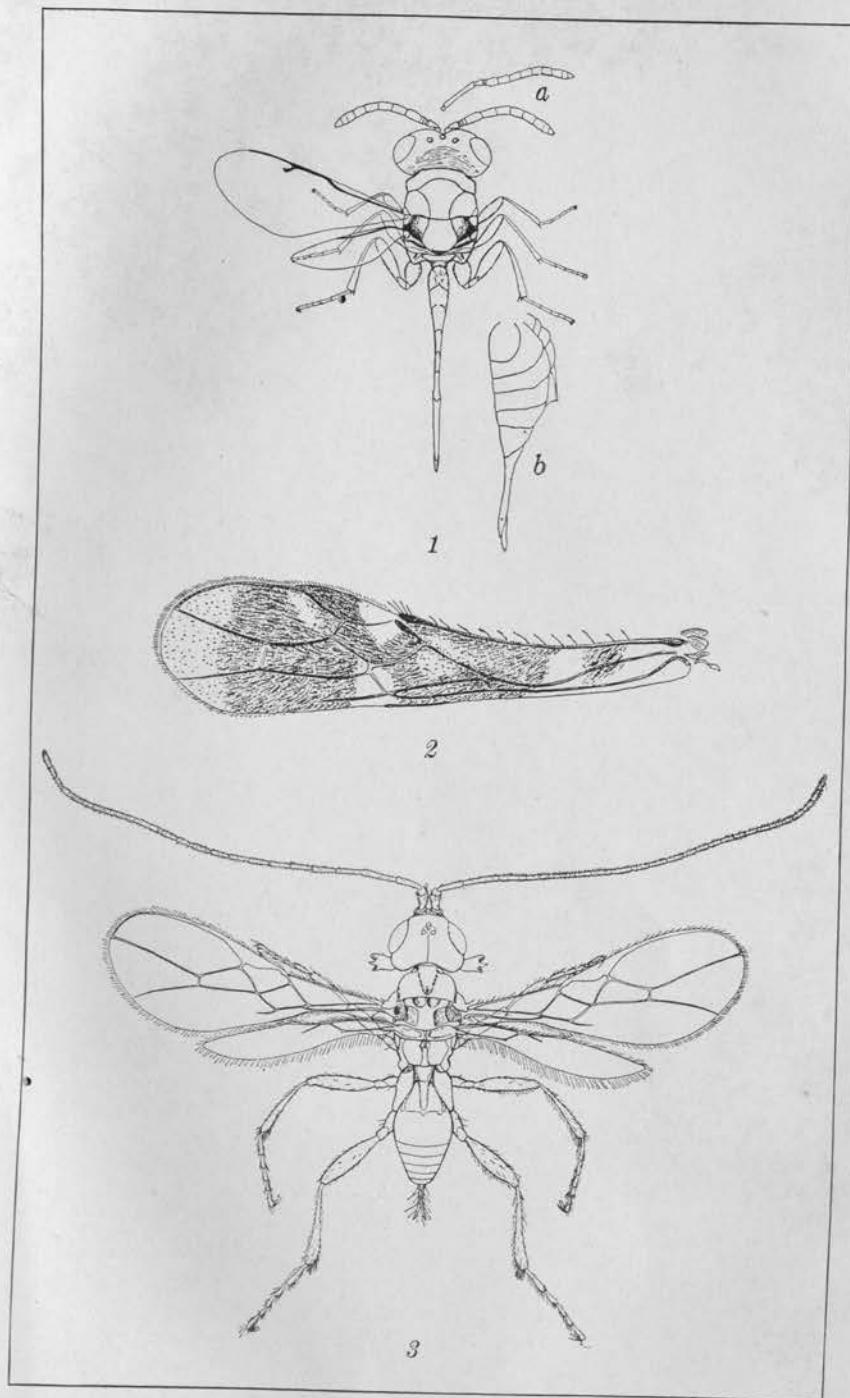
Ceraphron manilae Ashmead.

Two females, reared from *Argina cibraria* at Los Baños, Philippine Islands, received from C. F. Baker under his No. 18625.

ILLUSTRATION

PLATE 1

- FIG. 1. *Pycnetron curculionidis* g. et sp. nov., female; *a*, antenna of male;
b, lateral view of female abdomen.
2. *Spathius dinoderi* sp. nov., forewing.
3. *Phaenocarpa (Asobara) bactrocerae* sp. nov., female.



THE BUMBLEBEEES OF THE PHILIPPINE ISLANDS
(BREMIDÆ: HYMENOPTERA)¹

By THEODORE H. FRISON

Of Urbana, Illinois

ONE PLATE

The present paper is the result of a study of a series of specimens of bumblebees very kindly sent to me from the Philippine Islands by Charles Fuller Baker, and of a specimen of *Bremus mearnsi* (Ashmead) sent to me by S. A. Rohwer from the collection of the United States National Museum. In this paper a complete summary, to date, is given of our systematic knowledge of the bumblebees of this region, together with such additional facts as have been obtained by the study of the above-mentioned material.

Bremus mearnsi (Ashmead) (bakeri Cockerell = var.).

Ashmead (1905) had the honor of describing the first species of bumblebee, *Bremus mearnsi*, from the Philippine Islands. This species was described from a single specimen of the worker caste taken on Mount Apo, Mindanao, at an altitude of about 1,800 meters. In addition to this type worker, the United States National Museum possesses a large female bumblebee which is undoubtedly the queen of this species. This queen, according to the label on the specimen, comes from the "Apex of Mt. Malindang, Mindanao, P. I." and was collected on "7-6, 1906," by E. A. Mearns, the collector of the type worker. At my request, Mr. Rohwer kindly compared this queen with the type worker of *Bremus mearnsi*, and it is evident from this comparison that

¹ Numerous genera of northern plants and insects are found about the summits of the higher mountains of the Philippines, but are mostly unknown at lower altitudes. The isolated mountains are like islands; each possesses its peculiar species. Most of the higher mountains are unknown entomologically. It is extremely interesting that bumblebees, most characteristic of boreal regions, should have been found on several of the higher mountains, always near the summit. Doubtless they occur on all of our higher mountains, though they are never seen below.—C. F. BAKER.

the Mount Malindang specimen is the undescribed queen of *B. mearnsi*. The fact that the two specimens are from the same island, in a region where there are but few species of bumblebees, is further evidence in support of this conclusion. The following description is given of the previously unknown queen:

Queen.—Pubescence on front of head between and below antennæ yellowish brown, that just above antennæ and bordering median margin of compound eyes darker brown. Occipital orbits with brownish pubescence, with numerous small punctures. Occiput with a triangular patch of chocolate brown hair. Labrum with tuberclelike areas, which are prominent, shiny, and with few punctures, the space between them nearly equal to the length of the second flagellar segment; shelflike projection broad, strongly punctate; pubescence yellowish brown, almost golden in color. Mandibles distinctly three-toothed; there is, however, a much less developed fourth tooth at the lower apical angles; setæ on distal portion of mandible between the raised, smooth, longitudinal ridges very short, dense, golden in color; setæ on the lower portion much longer and of the same color as the short setæ. Clypeus smooth, shiny, with a few small punctures on its disk, and large punctures mixed with smaller ones on the lateral, dorsal, and anterior portions. Malar space slightly longer than its width at articulation of mandible (from precoila to post-coila), about one-half as long as the greatest width of, and one-fifth as long as, the compound eye, smooth, shining, but feebly punctate. Ocelli situated just above the narrowest part of the vertex; each lateral ocellus about its diameter distant from the median ocellus; area between lateral ocelli and median margin of compound eyes polished, almost impunctate. Flagellum slightly more than twice as long as the scape; third flagellar segment longer than the fifth, the fifth slightly longer than the fourth.

Dorsum of thorax and upper portion of pleura with moderately long chocolate brown pubescence, that on the lower portion of pleura yellowish; center of disk smooth and almost impunctate.

Abdomen with the first three basal dorsal abdominal segments covered almost entirely with moderately long chocolate brown pubescence, and that on the three apical segments light yellowish brown. Pubescence on the greater part of the sixth dorsal segment short, but becoming longer on lateral margins. Venter with moderately long pubescence of the same color as the dorsal apical segments fringing posterior margins of the segments.

Hypopygium without a median carina, epipygium with a slight median carina.

Legs with pubescence yellowish brown, that on the tibiæ of the middle and hind legs almost golden. Metabasitarsus distinctly arcuate and outer surface nearly flat. Corbiculæ slightly shagreened. Distal end of mesobasitarsus without a pronounced projection.

Proximal portion of the wings yellowish, distal portion distinctly suffused, nervures prominently outlined in dark brown.

Length, 19 millimeters; spread of forewing, 39; width of abdomen at second segment, 10.

Morphotype queen, apex of Mount Malindang, Mindanao. Collected "7-6, 1906," by E. A. Mearns. Deposited in the collection of the United States National Museum.

Recently Cockerell (1920) described a species of bumblebee from Negros, Cuernos Mountains, Philippine Islands, under the specific name *bakeri*. A careful comparison of a queen of *Bremus bakeri*, from exactly the same locality as Cockerell's type, reveals the fact that this form is structurally identical with the queen of *Bremus mearnsi*. Certain differences in coloration, however, justify the retention of *bakeri* as a varietal name for this color variety of *Bremus mearnsi*. The queen of *Bremus mearnsi* var. *bakeri* differs from the description just given of *Bremus mearnsi* as follows: That portion of the pubescence on the head, thorax, and abdomen of *mearnsi*, which is described as being chocolate brown, is almost black in var. *bakeri*, and in addition the greater portion of the fourth dorsal abdominal segment.

There are several minor inaccuracies in Ashmead's description of the type (worker) of *Bremus mearnsi*, which should be noted. Mr. Rohwer writes me that the pubescence on the face is mostly yellowish; that of the occiput, dorsum, and sides of the thorax brownish; that on the first three dorsal abdominal segments brownish; and that on the last three dorsal abdominal segments yellowish. Ashmead described the pubescence of the body as "Black, clothed with a long, grayish pubescence, that on the abdomen more or less yellowish, mixed with some black hairs."

According to Cockerell (1920), *bakeri* resembles *Bremus evimius* var. *tonkinensis* in coloration, but is structurally related to *Bremus irisanensis* (Cockerell). The truth of the former of these two statements is evident, but the latter statement I am very much inclined to doubt. The lateral ocelli of *Bremus*

mearnsi and its variety *bakeri*, in the queen caste, are about their diameter distant from the median ocellus. In queens of *Bremus irisanensis*, however, the lateral ocelli are much farther removed from the median ocellus than their diameter. Another conspicuous difference between these two Philippine species of bumblebees is that the outer surface of the metabasitarsus (basal tarsal segment of the hind leg) of *Bremus irisanensis* is distinctly concave, whereas in *Bremus mearnsi* and its variety *bakeri* this particular surface is more nearly flat. This and such differences as exist in the punctuation on the face and that on the tubercle-like areas of the labrum, on the areas between the lateral ocelli and the median edge of the compound eyes, the difference in length of the malar space, etc., all indicate that the Philippine species of *Bremus* thus far described belong to different groups or subgenera. The lack of males, however, prohibits a final statement as to the group or subgenus to which *Bremus mearnsi* or its variety *bakeri* belongs. *Bremus irisanensis*, as shown in this paper, belongs to the subgenus *Pratobombus* Vogt (1911). *Bremus folsomi* Frison (1923) from Borneo seems to be closely related to *Bremus mearnsi* (Ashmead).

Bremus irisanensis (Cockerell).

This species was described by Cockerell (1910) from the worker caste. The specimens came from "Irisan, Bequet Prov.,² Luzon, Philippine Islands, May 28." More recently Cockerell (1920) has described the male of this species and a new variety of the same which he has named *baguionensis*. Among the specimens sent me by Dr. C. F. Baker for study are two queens, five workers, and two males of this species. Of this number two queens and one of the males have the apical dorsal abdominal segments black, or mostly so, and accordingly agree in coloration with Cockerell's type worker and his description of the male. The remainder of the specimens belong to variety *baguionensis*. As the queen has not been recognized heretofore the following description is given:

Queen.—Pubescence on all parts of the head entirely black. Occipital orbits with numerous punctures. Labrum with transverse-elongate tuberclelike areas, shiny, with few punctures, separated by a narrow median fissure; shelflike projection broad,

² This is doubtless Benguet Subprovince. Irisan is a small Igorot settlement near Baguio. The type of *Bombus irisanensis* was probably collected by McGregor in 1903.—EDITORS.

strongly punctate; pubescence slightly ferruginous. Mandibles distinctly three-toothed, with a very slight indication of a fourth tooth at the lower apical angles; setæ near postartis (lower proximal end of mandible) very long, slightly ferruginous. Clypeus with median or disk smooth, shiny, impunctate, large punctures confined to anterior, lateral, and dorsal margins. Malar space somewhat longer than its width at articulation of mandible (from precoila to postcoila), considerably over one-half as long as greatest width of, and about one-fourth as long as, the compound eye; smooth, polished, almost impunctate. Ocelli situated well above narrowest part of the vertex; each lateral ocellus farther removed from the median ocellus than its diameter; outer half of area between lateral ocelli and median margin of compound eyes strongly punctate. Flagellum slightly more than twice as long as the scape; third flagellar segment but slightly longer than the fifth, the fifth longer than the fourth.

Dorsum of thorax and upper anterior corners of pleura with black pubescence, that on remaining areas of pleura yellow or fulvous yellow; a narrow, elongate streak in the center of the disk smooth and impunctate.

Abdomen with yellow or fulvous-yellow pubescence on the first two dorsal abdominal segments, pubescence on the remaining segments black. Pubescence on the greater part of the sixth dorsal abdominal segment short, but becoming longer on lateral margins. Venter with moderately long black pubescence fringing posterior margins of segments. Hypopygium with a slight indication of a median carina, epipygium slightly concave.

Legs with pubescence black, cuticle of legs, particularly of tibiæ and tarsi, in many places with a reddish suffusion. Outer surface of metabasitarsus distinctly concave. Corbiculæ polished. Distal end of mesobasitarsus with a pronounced toothlike projection.

Wings fuliginous throughout.

Length, 17 millimeters; spread of wings, 37; width of abdomen at second segment, 8.

Morphotype queen from Imugan, Nueva Vizcaya Province, Luzon, collected by C. F. Baker and deposited in my collection. Paramorphotype queen from Baguio, Benguet Subprovince, collected by C. F. Baker and deposited in the collection of C. F. Baker.

The coloration of the queen is quite similar to that of the worker (type), which is not always the case among the Bremidæ.

The structural characters presented by the genitalia and spathæ of the male of the typical form are identical with those described and figured for the color variety *baguionensis*.

Bremus irisanensis var. *baguionensis* (Cockerell). Plate 1.

As already mentioned, in addition to the typical form of *B. irisanensis* just considered, there are five workers and one male in the series sent me for study which belong to *Bremus irisanensis* variety *baguionensis* (Cockerell), a variety described from the worker caste by Cockerell in 1920. These specimens all came from near Baguio, Benguet Subprovince, Luzon, and were collected by C. F. Baker (20893). In a letter to me Doctor Baker says that these specimens all came from a—

point called Haight's Place * * * which is near 8000 feet altitude and has occasional light frosts. *Rubus*, *Rosa*, *Quercus*, *Viola* and other northern genera of plants abound there.

The variety *baguionensis* is distinguished from typical specimens of *irisanensis* in having some fulvous or reddish fulvous pubescence upon the apical dorsal abdominal segments. Since the male of this variety has not been heretofore recorded, or many of the structural characters of the species itself described, the following description is given:

Male.—Clypeus and front of head both below and above antennæ covered with dense, short, whitish fulvous pubescence, intermixed with numerous long brownish setæ. Occipital orbits with pubescence of similar character and color as that on the clypeus, but much less dense; moderately punctate. Occiput with a triangular patch of pubescence similar to that on the front of head and connecting on sides with the pubescence on occipital orbits. Labrum polished, smooth, with scattered punctures; on each lateral portion a slightly elevated rounded tuberclelike area which is highly polished and almost impunctate. Mandibles almost entirely covered with a dense, golden or light ferruginous pubescence, that fringing lower edge rather long. Malar space about one and one-half times as long as its width from precoila to postcoila, over one-half as long as the greatest width of, and about one-fourth as long as, the compound eye, polished, but feebly punctate. Ocelli situated just above narrowest part of the vertex; each lateral ocellus closer to the median ocellus than its diameter; area between lateral ocelli and median margin of compound eyes polished, almost impunctate. Flagellum over three times as long as the scape; third flagellar segment shorter than the fifth and slightly longer than the fourth.

Dorsum of the thorax with ochraceous pubescence, that on the pleura considerably lighter; center of the disk smooth and impunctate.

Abdomen with the first two basal dorsal segments covered with pale fulvous pubescence, third and fourth segments with dark brownish pubescence, and last three segments with light ochraceous or light ferruginous pubescence. Venter with moderately long pubescence, of the same color as that on the first two dorsal abdominal segments, fringing posterior margins of the segments.

Genitalia (Plate 1, fig. 1) with the heads of the sagittæ sickle-shaped, their distal points being rather bluntly rounded and directed upward; volsellæ with their inner apical projections sharply pointed. Inner spatha and outer spatha are shown in Plate 1, figs. 2 and 3, respectively. The structures presented by the genitalia and spathæ show that this species of bumblebee belongs to the widely distributed subgenus *Pratobombus* Vogt (1911).

Legs with pubescence of proximal segments light fulvous, that on tarsi and fringes of metatibiæ almost ferruginous. Metatibiæ with central portion of outer surfaces bare, highly polished, resembling slightly developed corbiculæ.

Wings fuliginous, distal portion more suffused.

Length, 15 millimeters; spread of forewings, 30; width of abdomen at second segment, 6.

Allotype male of variety *baguionensis*, Baguio, Benguet Sub-province, Luzon, collected by C. F. Baker (20894). Allotype deposited in my collection.

Key to the Philippine species and varieties of Bremus.

QUEENS AND WORKERS (FEMALES)

1. First and second dorsal abdominal segments with yellow or fulvous yellow pubescence; each lateral ocellus, in queen, farther removed from the median ocellus than its diameter; outer half of area between lateral ocelli and median margin of compound eyes strongly punctate in queen, less so in worker..... 2.
First and second dorsal abdominal segments with black or chocolate brown pubescence; each lateral ocellus about the length of its diameter distant from the median ocellus; area between lateral ocelli and median margin of compound eyes smooth, shiny, outer portion with but few small punctures..... 3.
2. Apical dorsal abdominal segments entirely with black pubescence.
Bremus irisanensis (Cockerell).
Apical dorsal abdominal segments with some fulvous or reddish fulvous pubescence..... *Bremus irisanensis* var. *baguionensis* (Cockerell).

3. Pubescence of the thorax and basal dorsal abdominal segments nearly black; only the last two apical dorsal abdominal segments entirely reddish fulvous..... *Bremus mearnsi* var. *bakeri* (Cockerell).
 Pubescence of the thorax and basal dorsal abdominal segments chocolate brown; last three apical dorsal abdominal segments entirely or nearly yellowish brown or fulvous..... *Bremus mearnsi* (Ashmead).

MALES

1. Apical dorsal abdominal segments entirely with black pubescence. *Bremus irisanensis* (Cockerell).
Apical dorsal abdominal segments with some fulvous or reddish fulvous pubescence..... *Bremus irisanensis* var. *baguionensis* (Cockerell).

TABULATION OF CASTE DESCRIPTIONS OF SPECIES AND VARIETIES

- Bremus mearnsi* (Asmead); type, worker (1905).
Bremus mearnsi (Ashmead); morphotype, queen (antea, page 114).
Bremus mearnsi var. *bakeri* (Cockerell); queen (1920).
Bremus irisanensis (Cockerell); type, worker (1910).
Bremus irisanensis (Cockerell); male (Cockerell, 1920).
Bremus irisanensis (Cockerell); morphotype, queen (antea, page 116).
Bremus irisanensis var. *baguionensis* (Cockerell); type, worker (1920).
Bremus irisanensis var. *baguionensis* (Cockerell); allotype, male
(antea, page 118).

INTRODUCED SPECIES

In the Report of the Secretary of the United States Department of Agriculture for 1909, mention is made of the introduction "of bumblebees to the Philippine Islands for the purpose of fertilizing clover." This is "reported to have been measurably successful, and American bumblebees have been found in certain regions in the Philippines during the year." Another reference probably to the same introduction is found in a bulletin of the Bureau of Entomology of the United States Department of Agriculture (1911), which is as follows:

In the same way an attempt was made to introduce the common bumble-bee *Bombus pennsylvanicus* Degeer [*americanorum* (Fabr.)] of the United States into the Philippine Islands for the purpose of fertilizing red clover. These were sent in refrigerating baskets, carried by hand by Filipino students returning from the United States to the Philippines, and for the most part in the pupal stage. These were properly planted upon arrival and reared, and a few specimens have been recovered.

³ The male of *Bremus mearnsi*, or of its variety *bakeri*, is not known.

I am not aware of any additional records of the recovery of this species and am extremely doubtful whether the species became established. This account of the introduction is repeated here in order to forestall the possibility of the species being redescribed from Philippine material if the species is established in the Islands, and to lead to a settlement of this question.*

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* In extensive collecting of Philippine bees, this species has never been encountered. Even if it survived, it would probably have been driven to the highest altitudes.—C. F. BAKER.

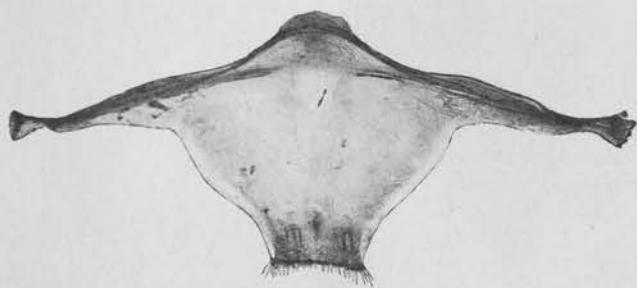
ILLUSTRATION

PLATE 1

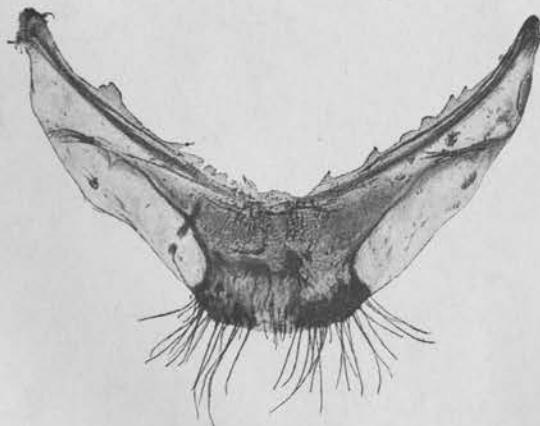
- FIG. 1. *Bremus irisanensis* var. *baguionensis* (Cockerell); male genitalia.
2. *Bremus irisanensis* var. *baguionensis* (Cockerell); inner spatha.
3. *Bremus irisanensis* var. *baguionensis* (Cockerell); outer spatha.



1



2



3

ZWEI NEUE CASSIDA-ARTEN AUS DEN PHILIPPINEN

Von FRANZ SPAETH

Vienna, Austria

In einer der letzten Sendungen des Herrn C. F. Baker befinden sich die folgenden zwei neue bemerkenswerte Arten der Gattung Cassida:

Cassida bakeri sp. nov.

Ovato-rotundata, valde convexa, nitida, flavo-testacea; antennae minus longae, apice vix incrassatae, articulo tertio secundo duplo longiore; clypeus subtrapezoidalis, planus, laevis; prothorax ellipticus longitudine duplo latior, antice minus, postice magis rotundatus, angulis breviter rotundatis, disco nitidissimo, laevi; elytra latitudine dimidio longiora basi sat emarginata, angulis humeralibus haud obtusis lateribus modice ampliatis, apice breviter rotundato, disco valde convexo, in basi haud retuso, profunde et sat crebre punctato-striato, callis utrinque tribus dilutioribus, multo subtilius et minus crebre punctatis, primo maximo intus a basi ad medium extenso, altero in parte protectali, ultimo apicem fere latum amplectente; protectum laeve, extus parum declive. 10×9 mm.

Exemplar unicum in insula Mindanao prope Surigao a domine Ch. F. Baker detectum in mea collectione conservatum est.

Eiförmig-gerundet, sehr hoch gewölbt und stark glänzend, ganz rötlichgelb, nur auf den Flügeldecken mit bräunlicher Färbung in den tiefen Stellen der Punktstreifen.

Fühler dünn aber nur mässig lang, die Halsschildecken kaum überragend, nach dem Ende kaum verdickt, mit kugeligem zweiten Gliede; das dritte, vierte, und fünfte sind 2.5 mal so lang als das zweite und als dick, unter einander ziemlich gleich, das sechste bis zehnte wenig kürzer, zweimal so lang als dick, vom siebenten an dünn behaart. Kopfschild flach, trapezförmig, mit mässig starken, vorne bogenförmig zusammenlaufenden Stirnlinien und glattem, stark glänzendem, dreieckigem Mittelstück. Halsschild elliptisch, um die Hälfte breiter als lang, vorne we-

niger, hinten mehr gerundet, mit kurz verrundeten Ecken vor der Längsmitte und glatter gewölbter Scheibe. Schildchen gleichzeitig dreieckig. Flügeldecken an der Basis ausgerandet und fein gekerbt, um ein Viertel breiter als der Halsschild mit vorgezogenen, mit den Halsschildecken in einer Querlinie liegenden, wenig abgestumpften Schulterecken; die Seiten bis vor die Mitte schwach erweitert, dann im Bogen verengt, hinten kurz, sehr schwach zugespitzt verrundet; die Scheibe sehr hoch, gleichmässig gewölbt, im Basaldreieck nur sehr kurz und schwach eingedrückt; die Punktstreifen, insoweit sie nicht in die schwielig erhabenen Stellen fallen, sehr grob, tief und regelmässig, so breit als die Zwischenräume; von der Höckerstelle geht eine grosse, glatte, heller gelbe, lebhaft glänzende Schwiele aus, die nach vorne bis zur Basis reicht, an den Seiten sich in zwei kurzen Gabeln bis über den fünften Streif ausdehnt und auf dem ersten und zweiten Zwischenraum bis hinter die Mitte reicht; eine zweite solche Schwiele bildet die hohe Seitendachbrücke und zieht sich auf den letzten zwei Zwischenräumen bis zur Basis, eine dritte, weniger hohe, füllt das ganze letzte Viertel der Scheibe aus; auf diesen Schwienen sind die Punkte der Streifen viel feiner, zum Teil erloschen; die dazwischen liegenden, tieferen Stellen haben grobe Punkte mit dunkleren Höfen, so dass auf jeder Decke eine braune Längsbinde aussen von der Schulterbeule bis über die Mitte zieht, sich hier einerseits zur Naht wendet, andererseits hinten die Seitendachbrücke umfasst; von den Streifen sind sonach der fünfte bis siebente von der Schulterbeule bis über die Mitte, die inneren aber nur im mittleren Drittel, die ersten zwei ausserdem im Basaldreieck tief und grob. Das Seitendach ist glatt und sehr stark glänzend, innen mehr, aussen wenig geneigt, vor der Seitendachbrücke nach innen erweitert. Klauen ungezähnt. Das letzte Sternit ist hinten dicht und fein runzelig gekörnt. Von *C. basilana*, der sie am nächsten steht, durch breiteren, mehr gerundeten Körper, weiter zurückliegende, breiter verrundete Halsschildecken, weniger vorgezogene, stumpfer gewinkelte Schulterecken, breiteres Seitendach, viel gröbere Punktstreifen und die Schwienbildung auf den Flügeldecken, und schwächere Endverbreitung des Klaunengliedes verschieden.

Für die Zuweisung der hier beschriebenen Arten zur Gattung *Cassida* ist eine Begründung notwendig. Boheman hatte die zahlreichen Arten, welche er nicht in andere Gattungen einzurichten vermochte, je nach der Fühlerlänge zu *Cassida* oder *Coptocycla* gestellt; damit wurde insbesonders die letztere Gattung ungeheuer polymorph und unpräzis. Chapin hat sich darauf

beschränkt, für die *Coptocycla*-Arten mit gekämmten Klauen *Ctenochira*, für jene mit gezähnten Klauen *Chirida* als neue Gattungen aufzustellen. Ohne sich bei der letzteren Gattung lange mit der Feststellung der zugehörigen Arten aufzuhalten, und weil er hiefür auch nicht die nötige Kenntnis der einzelnen Arten besass, zählte er zwei Typen auf: *elatior* Klug und *cruciata* L., beide aus Südamerika. Eine flüchtige Durchsicht hatte ihm gezeigt, dass die Mehrzahl der amerikanischen, sowie fast alle nicht amerikanischen *Coptocycla* einen Klauenzahn haben; sie hätten also damals zu *Chirida* gestellt werden müssen. Weise, der sich zuerst um eine schärfere Abgrenzung jener Gattungen bemühte, erkannte dass *cruciata* Fühlerrinnen habe, *elatior* aber nicht, und dass daher beide nicht in derselben Gattung bleiben können. Es wäre wohl zumindest einfacher und für eine spätere Bearbeitung der Gruppe angenehmer gewesen, wenn Weise für jene Art, deren neugefundenes Merkmal ihre generische Absonderung notwendig macht, eine neue Gattung aufgestellt hätte; er verwendete jedoch *Chirida* für *cruciata* und errichtete auf *elatior* und die anderen Arten ohne Fühlerrinnen die Gattung *Metriona*, auf die sonach der oben erwähnte polymorphe Charakter der bisherigen Gattungen *Coptocycla* und *Chirida* übergehen musste.

In einer noch nicht veröffentlichten Arbeit über die amerikanischen *Coptocycla* (sens. Boh.) werde ich *elatior* durch die Form des Klauenzahns und die Skulptur der Flügeldecken von allen anderen bisher zu *Metriona* gestellten Arten trennen, und daher diesen Gattungsnamen auf sie allein beschränken. Noch weit weniger können dann aber die zahlreichen tropischen Arten der alten Weltteile bei *Metriona* belassen werden, da sie von *elatior* noch mehr als die amerikanischen Arten differieren. Sie weichen auch unter sich, besonders in der Klauen- und Fühlerbildung ab, während sie in sonstiger habitueller Hinsicht häufig sich ähneln. Bei *dysphorica* von den Philippinen ist zum Beispiel der Klauenzahn kräftig entwickelt, die Fühler sind sehr lang und dünn, bei *basilana*, *bakeri*, *quinquemaculata*, und *manillensis* ist die Klaue ohne Zahn und nur das Klauenglied am Ende mehr minder zahnförmig verdickt; die Fühler sind ebenfalls wesentlich kürzer; die Stellung dieser Arten zu *Metriona* wurde daher auch schon bisher ungerechtfertigt gewesen sein. Bei dieser Sachlage erscheint es wohl am zweckmässigsten, im Sinne des von Herrn S. Maulik¹ gemachten Vorschlag, die Gattungen

¹ Fauna Brit. Ind., Cassid. (1919) 363.

Coptocyclo und *Metriona* künftig für nicht-amerikanische Arten überhaupt nicht mehr anzuwenden, sondern solche Arten, insoweit sie nicht in eine andere Gattung schon jetzt eingereiht werden können, in der polymorphen Gattung *Cassida* bis zu ihrer definitiven systematischen Gliederung zu führen.

Cassida basilana sp. nov.

♀ : Ovato-rotundata, valde convexa, nitida, laete flava, marginibus basalibus prothoracis elytrorumque, sutura, punctis duobus transversim positis prothoracis maculæsque utrinque quinque parvis elytrorum nigropiceis, nempe duabus in basi, oblongis, obliquis, duabus mediis in disco, ultima in disco exteriore parum pone medium; prothorax subtriangularis, antice perparum, basi valde rotundatus, angulis ante medium sitis, subrotundatis, disco laevi; elytra prothorace dimidio latiora, basi sat emarginata, angulis humeralibus parum obtusis, lateribus modice ampliatis, disco convexo, seriato punctato, interstitiis latis, planis, laevis, protecto subdeplanato, laevi 8.75×7.5 mm.

Exemplar unicum in insula Basilan Philippinarum a domine Ch. F. Baker detectime in mea collectione conservatum est.

Lebhaft gelb, zwei kleine Flecke nebeneinander auf der Scheibe und der Hintersaum des Halsschildes bis über die Ecken, die Basis der Flügeldecken bis zu den Schulterecken schmal pech schwarz; ebenso die Naht bis zur Spitze mit einer schwachen Verbreiterung an der Höckerstelle; dieselbe Farbe haben fünf Flecke auf jeder Decke, die als Reste einer ausgedehnteren dunklen Zeichnung verblieben sind und vielleicht nicht konstant sein dürften; zwei an der Basis, beide oblong und schräg nach aussen gerichtet, der äussere auf der Schulterbeule, der zweite am Beginn der nächsten Punktreihe; dann zwei in der Mitte, hievon der vordere im Hauptgrübchen, punktförmig, der zweite gleich hinter ihm, grösser, unregelmässig gestaltet; der fünfte Fleck auf dem vorletzten Zwischenraum unmittelbar nach der Seitendachbrücke. Fühler und Unterseite einfarbig gelb, etwas gesättigter als die Oberseite.

Eiförmig gerundet, kaum ein viertel länger als breit, hoch und gleichmässig gewölbt, ohne Bruch der Profillinie. Kopfschild trapezförmig, etwas kürzer als breit, mit dreieckigem, schwach gewölbtem, fast glattem Mittelstück und feinen, vorne von den Augen sich entfernen Stirnlinien, die im Bogen zusammenlaufen. Die Fühler mässig lang, wenig über die Halsschilddecken reichend, aussen schwach verdickt, das zweite Glied kugelig, das dritte doppelt länger als das zweite und um ein Viertel kürzer

als das vierte, mit dem fünften gleichlang, die äusseren ziemlich kurz, nur um die Hälfte länger als dick. Halsschild um die Hälfte breiter als lang, subtriangulär, vorne kaum, hinten stark gerundet, mit weit vorne gelegenen, ziemlich kurz verrundeten Ecken; die Scheibe stark glänzend, glatt. Schildchen dreieckig. Flügeldecken an der Basis tief ausgerandet, so dass die wenig abgestumpften Schulterecken in einer Querlinie mit den Hals-schildecken liegen, die Seiten wenig erweitert, das Ende ziemlich spitz zugerundet, die Scheibe hoch gewölbt, im Basaldreieck kaum eingedrückt, mit mässig feinen Punktreihe, die hinten fast verlöschen und in denen die Abstände, in welchen sich die Punkte folgen, viel grösser sind als die Punkte selbst; der Randstreif ist viel tiefer, durch eine hochgewölbte Seitendach-brücke lange unterbrochen; die Zwischenräume sind vielmehr breiter als die Punktreihe, glatt, der letzte um die Hälfte breiter als die anderen. Prosternum breit, mit stark erweitertem Fort-satz. Die Klauen glatt, mit einer sehr stumpfen, zähnchenförmigen Erweiterung an der Basis. Das letzte Sternit hinten weit und sehr seicht ausgerandet, fein körnig gerunzelt (sex-uelles Merkmal!).

Am nächsten mit *C. dysphorica* Spaeth² verwandt, wesentlich grösser und schmäler, hinten viel mehr zugespitzt (Weibchen!), höher gewölbt, der Halsschild subtriangulär, mit viel weiter vorne gelegenen, kürzer verrundeten Ecken und weniger gebogenem Vorderrand, die Schulterecken stärker vorgezogen, die Seiten der Flügeldecken weniger erweitert, die Punktreihe schwächer und viel weniger dicht besetzt, die Zwischenräume breiter, die Seitendachbrücke viel höher und kräftiger. Die Fühler sind dicker, verhältnismässig kürzer, das siebente bis zehnte Glied nur um die Hälfte länger als dick, während sie bei *dysphorica* mehr als doppelt so lang sind; der Klauenzahn ist stumpfer und schwächer. Von *dysphorica*, welche Herr Ch. F. Baker auf Luzon auf dem Mount Maquiling, und auf Mindanao bei Butuan gesammelt hat und die mir sonst noch von Manila (Simon), Mindanao, den Molukken, und Celebes vorliegt, hat Herr Baker ein Stück (No. 6098) in Baguio, Benguet, gesammelt, bei welchem die bindenartige Zeichnung der Flügeldecken fast wie bei der früher beschriebenen *basilana* reduziert ist; es sind nur die zwei strichförmigen Basalflecke, eine Makel im Basaldreieck, und sechs oder sieben teilweise verbundene Flecke auf jeder Scheibe pechbraun.

² Ann. Mus. Nat. Hung. 15 (1919) 201.

DIE TENEBRIONIDEN (COLEOPTERA) DES INDO-MALAYISCHEN GEBIETES, UNTER BERUECKSICHTIGUNG DER BENACHBARSTEN FAUNEN, IV

DIE GATTUNGEN PHLOEOPSIDIUS, DYSANTES, BASANUS, UND DIAPERIS

Von HANS GEBIEN

Hamburg, Germany

EINE TAFEL

Subfamilia DYSANTINÆ nova

Das Fehlen einer Gelenkhaut zwischen den letzten Abdominalsegmenten bei den Tenebrioniden ist ein Merkmal von hohem systematischem Wert, das geeignet ist ganze Unterfamilienreihen von einander zu trennen. Es ist daher seit Leconte und Horn von allen Systematikern mit Erfolg zur Einteilung der schwierigen Familie der Tenebrioniden verwandt worden. Umsoweniger lässt sich auf dieses Charakteristikum verzichten, als in dieser Familie an wirklich durchgreifenden Merkmalen grosser Mangel ist. Charaktere, die wo anders Familien trennen, haben hier oft nur den Wert von Gattungsmerkmalen. Die Boletophagiden rechnete man bisher zu den Unterfamilien mit Gelenkhaut zwischen den letzten Abdominalsegmenten. Kein Autor scheint aber die exotischen Gattungen auf die Richtigkeit dieser Angabe nachgeprüft zu haben. Eine Durchsicht der mir bekannten Gattungen ergibt aber die interessante Tatsache, dass verschiedene von ihnen einer Gelenkhaut ermangeln. Das sind die folgenden: *Dysantes* Pascoe, *Calymmus* Pascoe, *Ozolais* Pascoe, *Mychestes* Pascoe, *Orcopagia* Pascoe, *Glyxerius* Pascoe, und *Phloeopsidius* g. nov.

Genus PHLOEOPSIDIUS novum¹

Gestreckt, flach, geflügelt. Körper sehr rauh. Kopf lang, vor den Augen stark entwickelt, die Augen sind kreisrund,

¹ *Endophloeus flexuosus* Solander ist durch Lacordaire in die Gattung *Boletophagus* gekommen, mit der sie kaum Verwandtschaftsbeziehungen hat. Es ist vielmehr eine neue Gattung darauf zu gründen, die ich *Phloeopsidius* nenne.

halbkugelig gewölbt, und werden durch die Wangen nicht eingengt, diese gehen vielmehr, sich nach hinten verengend, am Innenrand der Augen als hocherhabene Augenfalten weiter, vorn sind sie winklig und so breit wie die Augen. Die Oberfläche ist sehr uneben, das Epistom ausserordentlich lang, stark gewölbt, der Quereindruck breit und tief, der Vorderrand ist gerade abgestutzt. Fühler mässig lang, 11-gliedrig, am Grunde dünn, Glied 3 verlängert, am Ende befindet sich eine stark abgesetzte, 3-gliedrige, knopfartige Keule deren Glieder frei sind. Das Mentum ist quadratisch, flach, die Seitenlappen des Submentums sind stark schwielig erhaben, schräg abgestutzt, und lassen zwischen sich und dem Auge eine schmale aber deutliche Fühlerfurche, das Endglied der Maxillarpalpen ist sehr kurz zylindrisch, die Mandibeln sind am Ende gefurcht. Halsschild sehr uneben, mit vorragenden Vorderecken, die bis über die Augen hinaus ragen, Seiten verflacht, Basis jederseits neben den Hinterecken ausgeschnitten, Seitenrand krenuliert, Schildchen erhaben, quer. Flügeldecken mit knotigen Längserhabenheiten, krenulierten Seitenrand, und vollständigen, bis zum Ende gleichbreiten Epipleuren. Unterseite flach, Prosternum hinten gesenkt, vorn sehr lang, flach, Mesosternum schwach abschüssig, nicht eingedrückt. Abdominalsegmente mit scharfkantigen und gefalteten Hinterrändern der Segmente, ohne sichtbare Gelenkhaut. Beine sehr kurz, Schenkel unten ungekantet, Schienen ungekielt.

Typus dieser chilenischen Gattung ist *Endophloeus flexuosus* Solander, eine Art die der Autor in die europäische *Colydiden*-Gattung stellte, mit der sie in der Tat Aehnlichkeit hat. Lacordaire weist ihre Zugehörigkeit zu den Boletophagiden nach. Hier stand sie bisher bei *Boletophagus*, der gar keine Beziehungen zu ihr hat: Kopf, Augen, Fühler, und Mundteile trennen sie weit. Eine zweite hierher gehörige Art ist *Endophloeus angustatus*.

Dagegen gehört *Boletophagus costulatus* Fairmaire aus Chile zu den Boletophagiden, unterscheidet sich aber von *Boletophagus* durch fest auf der Stirn eingelenkte Fühler, ganz nach aussen gerichtete Wangen und kugelige erste Fühlerglieder.

Genus DYSANTES Pascoe

Dysantes PASCOE, Ann. & Mag. Nat. Hist. IV 8 (1871) 348.

Die Beschreibung der Gattung bei Pascoe ist nicht schlecht, doch bedarf sie in Rücksicht auf die zahlreichen seither beschriebenen Gattungen von Boletophagiden einiger Ergänzungen.

Körper geflügelt, lang. zylindrisch, oben schwach depresso-
siv. Kopf ungehörnt, Augen ungeteilt, Wangen knotig aufgeworfen,
kurz eckig vor die Augen tretend. Epistom gerade abgestutzt,
Schläfen dick hinter den Augen liegend, Hinterkopf plötzlich zu
einem Hals verengt. Fühler am Grunde sehr dünn, 11-gliedrig,
mit stark abgesetzter 3-gliedriger Keule. Mentum ungekielt,
gewölbt, Endglied der Maxillarpalpen schwach dreieckig, Mandi-
beln tief gefurcht, eine Kehlfurche fehlt, statt ihrer findet sich
ein querer Eindruck. Pronotum vorn mit langen, wagerechten
Hörnern in beiden Geschlechtern, durch körnige Leistchen une-
ben, die Seiten schwach verflacht, scharf gekantet, krenuliert,
Basis stark doppelbuchtig. Flügeldecken mit starken Schultern
und vollständigen, wenn auch schmalen, Epipleuren. Proster-
num vorn gut entwickelt, hinter den Hüften wagerecht, Vorder-
hüften kugelig, Mesosternum mit vorragenden Ecken, Metaster-
num sehr lang. Abdomen ohne sichtbare Gelenkhaut zwischen
den vorletzten Segmenten. Beine dünn und ziemlich lang,
Schenkel körnig rauh, Schienen schwach gebogen, zur Spitze
verjüngt, ohne Enddecke, ungekielt, Tarsen dünn.

Es sind bisher drei Arten bekannt geworden. Es scheint mir
aber als ob nur zwei anzunehmen sind, von denen die eine auf
Java, die andere auf Ceylon vorkommt. Die erste hat den
Namen *D. elongatus* Redtenbach zu führen, unter diesem
Namen ist das Männchen beschrieben, während Pascoe das
Weibchen als *D. taurus* beschreibt.

Dysantes elongatus Redtenbach.

Dysantes elongatus REDTENBACH, Reise der Oesterr. Freg. Novara um
die Erde, Wien (1867-1868) 127, t. 4, f. 4.

Dysantes taurus PASCOE, Ann. & Mag. Nat. Hist. IV 8 (1871) 349,
Weibchen.

Das Weibchen unterscheidet sich vom Männchen durch die
Gestalt der Prothoracalhörner, die bei ihm leierförmig und viel
länger und dünner als die einfach nach innen gekrümmten
Hörner des Weibchens; ferner zeigen die ersten Abdominalseg-
mente einen Flaum feiner Haare, die dem Weibchen fehlen; der
Penis ist sehr zart.

Java (meist ohne genauere Angaben); Toegoe (*Pasteur*) nach
Gravely² auch von Tenasserim; Sukli, 2,000 Fuss.

In den Sammlungen Leyden, Stettin, Berlin, und Hamburg.

² Rec. Ind. Mus. VIII 8 (1915) 523.

Dysantes biluna Walker.

Dysantes biluna WALKER, Ann. & Mag. Nat. Hist. III 2 (1858) 284.

Von dieser Art liegen mir nur zwei Weibchen vor. Sie ist der vorigen täuschend ähnlich, doch ist sie kleiner (8 statt 10 Millimeter), die Skulptur ist rauher, die vorletzten Fühlerglieder sind nur 1.5 mal so breit wie lang (bei der vorigen doppelt so breit), ferner sind die Hörner innen am Grunde verflacht, scharfkantig und ohne Wimpern, bei *elongatus* fast rund, viel dünner und mit feinen Wimpern versehen.

Ceylon (*Nietner*). Peradeniya (*Horn*).

In den Sammlungen Dahlem und Berlin.

Beide Arten scheinen selten zu sein, mir liegen nur wenige Stücke vor.

DIAPERINÆ**SYSTEMATISCHES**

Diese dritte grosse Unterfamilie der pilzfressenden Tenebrioniden ist im indo-malayischen Gebiet vorzüglich vertreten, besser und besonders mannichfältiger als in irgend einer andern Fauna. Der Zahl der Arten nach, besonders aus der Gattung *Platydema* und *Hoplocephala* übertrifft allerdings Amerika unsere Fauna. Leider ist die Unterfamilie in systematischer Beziehung ganz ungeklärt. Es ist bis jetzt nicht gelungen, ein durchgreifendes Merkmal zu finden, das die Diaperinen in ihrer Gesamtheit von den übrigen Tenebrioniden abtrennt. Die bisherige Umgrenzung der Unterfamilie, wie sie Lacordaire gibt, kann unsren Ansprüchen nicht genügen. Er hat nur einen kleinen Teil der jetzt bestehenden Gattungen gekannt (acht von vierzig), ausserdem macht er den alten Autoren zuviel Zugeständnisse. Es würde hier zu weit führen, wenn ich auf die verschiedenen Systeme einginge, welche die Entomologen der verschiedenen Länder über die Tenebrioniden ausarbeiteten. Fast alle Bearbeiter erkennen Lacordaire an und übernehmen in seinem Sinne die Unterfamilie der Diaperinen. Erst Reitter hat ganz neuerlich in seinen Bestimmungsschlüssel für die Unterfamilien der Tenebrioniden die Diaperinen aufgeteilt. Er nimmt zwei Unterfamilien an: Diaperinæ mit den Gattungen *Diaperis*, *Hoplocephala*, und *Pentaphyllus*; und Platydeminæ mit *Platydema*, *Scaphidema*, *Alphitophagus*, und *Metaclisa*. Beide scheiden sich durch die Länge des ersten Gliedes der Hintertarsen. Ich kann leider diese Einteilung für die asiatischen Gattungen nicht anerkennen, es gibt bei *Hoplocephala* und auch in andern Gattungen Arten von denen man nicht wüsste welcher Unterfamilie man

sie zurechnen sollte. Auch das Merkmal "eine Gelenkhaut zwischen Oberlippe und Epistom ist vorhanden," das beiden Gruppen zukommen soll, trifft bei *Menimus* und *Labidocera* nicht zu, bei einigen andern (zum Beispiel *Scaphidema* und *Ischnodactylus*) ist die Haut undeutlich oder fehlt. Es ist daher besser auf dieses zweifelhafte Kriterium zu verzichten.

Es dürfte vielleicht empfehlenswert sein, die Unterfamilie auf alle Gattungen zu beschränken die eine fein krenulierte, scharfe Kante an den Schienen hinten haben. Dieses Merkmal ist bisher ganz übersehen. Im Zweifelfalle sollte das den Ausschlag geben. Ich rechne daher *Basanopsis*, die glatte Schienen hat, zu den Uломiden, wo sie in die nächste Nähe von *Diaclina* kommt.

Eine neue Einteilung der verwandten Unterfamilien zu versuchen ist hier nicht der Platz; sie müsste alle Gattungen der Welt berücksichtigen und nicht nur die wenigen Gattungen einer Fauna umfassen. Ich fasse also hier, rein aus Zweckmässigkeitsgründen, die Diaperinen im alten Umfange, trotzdem ich die Unzulänglichkeiten der Lacordaire'schen Einteilung wohl kenne.

Ausser den in der Tabelle ausgewiesenen Gattungen sind im Coleopterorum Catalogus noch eine Anzahl anderer Gattungen in diese Unterfamilie gestellt. Eine Prüfung ergab aber dass sie nicht hineingehören. Das sind die folgenden:

Metaclisa gehört zu den Halopiden.

Tetragonomenes und *Addia* sind mir unbekannt; sie gehören wahrscheinlich zu den Cnadaloniden.

Hemicera ist eine Cnadalonide und aufs nächste mit *Eucyrtus* verwandt.

Viele als *Eucyrtus* beschriebene Arten gehören zu ihr.

Diphyrrhynchus ist eine Pedinide.

Derispia ist eine Leiochride.

Basanopsis ist eine Uломide.

Von den noch verbleibenden oder neu errichteten Gattungen stehen allerdings einige besser isoliert, da auffällige, wichtige Merkmale sie von allen andern Diaperiden unterscheiden. So hat *Labidocera* nicht nur abenteuerlich gestaltete Fühler, sondern auch offene Gelenkhöhlen der Vorderbeine. Auch *Menimus* und *Enanea*, mit nur 10-gliedrigen Fühlern und bedornten Sohlen der hinteren Füsse und winzigen Augen, können wohl Anspruch auf einen eigenen Platz erheben.

GEOGRAPHISCHE VERBREITUNG

Manche Gattungen dieser Unterfamilien sind ausserordentlich weit verbreitet. Ja, wenn wir die Uломinen wegen ihrer vielen, durch den Handel verschleppten kosmopolitischen Arten

ausnehmen, ist es diese Unterfamilie welche die meisten sehr weit oder über alle Erdteile verbreiteten Gattungen enthält. In der Tabelle weiter unten werden dreizehn Diaperiden-Gattungen für das indo-malayische Gebiet angenommen. Von diesen sind nur vier auf das Gebiet, im weitesten Sinne genommen, also mit Einschluss von Japan, Südchina, und Celebes, beschränkt: *Labidocera*, *Basanus*, *Anisocara*, *Ischnodactylus*. Nur Zwei Gattungen, *Labidocera* und *Anisocara*, sind lokal; die andern beiden sind weit verbreitet. Von den andern neun Gattungen sind:

Platydema und *Hoplocephala*, über alle Weltteile verbreitet.

Diaperis und *Scaphidema*, über Europa, Asien, und Amerika.

Pentaphyllus, über Europa, Asien, Afrika, und auf den Inseln des stillen Ozeans (eine neue Art, in den Sammlungen Hamburg und Gebien).

Ceropria, im australischen, papuanischen, indo-malayischen, und afrikanischen Gebiet.

Martianus, im papuanischen und asiatischen Gebiet und Ostafrika nebst Inseln.

Spiloscapha, im australischen und indo-malayischen Gebiet.

Menimus, in Neu-Seeland und im indo-malayischen Gebiet.

Die Arten allerdings sind nie so weit verbreitet, so finden wir keine kosmopolitische Art bei den Diaperiden, wohl aber einige die im ganzen indo-malayischen Gebiet bis ins papuanische vorkommen; so *Martianus dermestoides*, *Platydema malaccum*, und *P. tricuspis*. Ausserdem sind auch eine Anzahl Arten von *Platydema* innerhalb des Gebietes sehr weit verbreitet; zum Beispiel, *P. subfascia*, *P. waterhousei*, *P. pallidicolle*, *P. marseuli*.

Die Diaperinen sind, wie es scheint, ausschliesslich an Baumschwämme gebunden. Zur Erklärung ihrer geographischen Verbreitung ist es daher nötig die Wirtspilze und ihre Verbreitung zu kennen. Leider ist nicht ein einziger Wirtspilz bekannt. Nur Eichelbaum gibt für einige afrikanische Arten den Pilz *Fomes nigrolaccatus* an. Auch Angaben darüber, ob die Tiere monophag sind, fehlen gänzlich.

Als Wirtspilze für die pilzfressenden Tenebrioniden, die Boletophaginen und Diaperinen, dürften die Gattungen *Polyporus* und *Fomes* hauptsächlich wenn nicht allein, in betracht kommen. Nun sind diese Gattungen, wie bekannt, beide in allen Weltteilen verbreitet. Schon das allein erklärt die Verbreitung der Diaperinen und Boletophaginen. Eine Durchsicht der Pilzbände von Engler and Prantl, "Natürliche Pflanzenfamilien," ergibt aber die überraschende Tatsache, dass auch sehr viele Arten der genannten Gattungen eine ausserordentlich weite Verbreitung haben. Es würde hier natürlich zu weit führen, wenn ich die Gebien).

weit verbreiteten Baumschwämme alle anführen, aber ich möchte mir nicht versagen, wenigstens für einige Arten, besonders soweit sie auch im indo-malayischen Gebiet vorkommen, die Verbreitung anzugeben:

- Fomes obliquus* Pers., Europa, Nord- und Südamerika, Westindien, Afrika, Ceylon, und Australien.
- Fomes rufoflavus* B. and C., Malacca, Borneo, Cuba, Zentralamerika.
- Fomes pectinatus* Klotzsch, Europa, Nordamerika, Australien, Java, Philippinen, India Oriental, und Afrika.
- Fomes amboinensis* (Lam.) Fr., an Stämmen in fast allen Tropenländern häufig.
- Fomes gibbosus* Nees, in Java und Australien.
- Polyporus auberianus* Mont., Südamerika, Westindien, Australien, tropisches Afrika, und Neu-Guinea.
- Polyporus plebejus* Berk., Brasilien, India Oriental, und Neu-Seeland.
- Polyporus betulinus* Bull., Europa, Sibirien, und Nordamerika.
- Polyporus gilvus* Schwein., Nord- und Südamerika, Westindien, Afrika, Australien, Neu-Guinea, Malayisches Archipelago, und Ostindien.
- Polyporus cupreus* Berk., Ostindien, Australien.
- Polyporus tabacinus* Mont., Chili, Neu-Seeland, Java, und tropisches Afrika.

Ob diese Pilze als Wirte für die Tenebrioniden inbetracht kommen muss genauere Prüfung zeigen. Mir schien diese kleine Auswahl aus einem gewaltigen Gebiet interessant genug.

Von hervorragendem Interesse und näherer Betrachtung wert ist das Auftreten zweier Gattungen, die wir bisher nur von Australien, respektiv Neu-Seeland, kennen. Die eine ist *Mennimus*, von der alle Arten bis auf eine recht abweichende aus Japan, von Neu-Seeland bekannt sind.³ Ich kenne keine zweite Gattung die eine ähnliche Verbreitung zeigt. Die hier neu beschriebenen Arten *kraepelini* und *rugicollis* sind aber den neu-seeländischen sehr ähnlich. Es sind also zwei Verbreitungszentren bekannt; das indo-malayisch-japanische und das neu-seeländische. Im ganzen, dazwischen liegenden australischen und papuanischen Gebiet scheint sie zu fehlen. Auf Neu-Kaledonien wird sie durch die verwandte Gattung *Parta* vertreten. Ich wage nicht, Zusammenhänge aus vorzeitlichen Erdperioden zu konstruieren, sondern möchte allein die an sich schon interessante Tatsache feststellen. Es soll besonders betont werden dass es sich nicht um eine Gattung handelt die mit zahlreichen andern verwandt ist, so dass also eine äussere Aehnlichkeit für

³ Doch liegt mir die Gattung jetzt aus Mjöbergs Ausbeute aus Australien vor, und zwei Exemplare einer neuen Art aus Neu-Guinea (Britisches Museum).

Verwandtschaft genommen werden kann. Die Gattung ist vielmehr durch zahlreiche Merkmale so ausgezeichnet, dass sie ganz isoliert steht (zum Beispiel, winzige Augen, 10-gliedrige Fühler, Dörnchen an den Sohlen, etc.).

Recht eigentümlich ist übrigens auch das Vorkommen der australischen Gattung *Spiloscapha* auf Java, unter Uebergehung des papuanischen Gebietes. Doch steht dieses Vorkommen nicht vereinzelt da. Ich erinnere an die Gattungen *Cossyphus*, *Menephilus*, *Byrsax*, und *Trachyscelis*, die alle in Australien und im indo-malayischen Gebiet heimisch sind, aber das papuanische, wie es scheint, meiden. Uebrigens ist *Spiloscapha* mit der weit verbreiteten Gattung (Europa, Nordasien, Nordamerika) *Scaphidemus* so nahe verwandt, dass einer Vereinigung beider kaum etwas im Wege stehen dürfte.

SEXUELLER DIMORPHISMUS

Auch bei vielen Diaperiden, ebenso wie bei den Boletophagiden, sind die Geschlechter oft in beträchtlichem Masse verschieden. In der Gattung *Ceropria*, innerhalb der Unterfamilie bei dieser Gattung allein, sind die Vordertarsen der Männchen, meist auch die Mitteltarsen, erweitert. Dieses Merkmal, das auch zum Beispiel bei sehr vielen Caraben auftritt und geeignet ist ganze Unterfamilienreihen zu trennen, hat bei den Tenebrioniden nicht immer so hohen systematischen Wert. Zwar kommt es allen Gattungen der Pediniden ohne Ausnahme zu, die dadurch allein von allen Opatriden geschieden werden können; aber in andern Unterfamilien kommt es nur vereinzelten oder der Mehrzahl der Gattungen zu. Erweiterte Vordertarsen treten zum Beispiel auch bei einigen Gattungen der Uломiden, Tenebrioniden, Amarygmiden, und Strongylien, und bei vielen Gattungen der Helopiden und Cnadaloniden vor. Da die erweiterten Tarsen vermutlich bei der Begattung eine Rolle spielen, sind sie, im Gegensatz zu den Kopfhörnern, fast nie individuellen Schwankungen unterworfen.

Ich habe schon bei der Unterfamilie der Boletophagiden ausgeführt, dass die sogenannten sekundären Geschlechtsmerkmale nicht gleichwertig sind. Die Kopf- und Prothoracalhörner sind bei Käfern, da sie nicht direkt in den Dienst der Begattung gestellt werden, in hohem Masse individuellen Schwankungen unterworfen. Vielleicht liegt die Sache bei *Labidocera* anders. Hier handelt es sich, nicht wie bei den Kopfhörnern anderer Insekten, um starre Auswächse des Chitinskeletts, sondern um bewegliche

Haken; es sind nämlich die ausserordentlich verlängerten, hakenförmigen ersten Fühlerglieder welche ein Horn bilden. Es ist möglich dass sie bei der Begattung, etwa zum Festhalten, eine Rolle spielen. Demnach müssten diese falschen Hörnchen zu den beständigen Gebilden gestellt werden. Bei den vier mir vorliegenden Männchen sind sie in der Tat ganz gleichartig, während zum Beispiel bei den gehörnten *Platydema* kaum zwei ganz gleiche Männchen gefunden werden. In sehr vielen Fällen ist das Männchen äusserlich vom Weibchen nicht mehr zu unterscheiden, denn auch in diesem Geschlecht kommen, wenn auch nicht Hörner, so doch scharfeckige Vorragungen auf dem Kopf vor (*P. marseuli*, zum Beispiel). Die Hornbildung beginnt mit kleinen rundlichen Tuberkeln, die allmählich höher werden.

Bei den fünf Gattungen *Platydema*, *Ischnodactylus*, *Hoplocephala*, *Pentaphyllus*, und *Anisocara* jedoch sind die Hörner auf dem Kopf nicht nur individuell in der Grösse sehr verschieden, sondern auch von Art zu Art, von Gattung zu Gattung in der Anlage anders. Auch da bieten die Diaperiden eine Mannichfaltigkeit, wie sie sonst innerhalb einer und derselben Gruppe von Insekten wohl kaum wieder vorkommen dürfte. Es finden sich ein, zwei, drei, oder vier Hörner auf dem Kopf; das eine Horn ist entweder einfach konisch, oder bis zum Grunde tief gespalten, also gabelförmig. Wesentlich mannichfacher tritt die Bewaffnung auf, wenn zwei Hörner vorhanden sind; sie sind einfach, kräftig, etwas dreieckig, oder lang, dünn, parallel, oder ausserordentlich lang, riemenförmig, und stark zum Kopf gebogen, also über diesem halbkreisförmig liegend, oder sie sind asymmetrisch, wie weiter unten ausgeführt und zwar wieder in grundsätzlich verschiedener Weise; sie sind nackt oder behaart, und in diesem Fall entweder einfach oder mit einem sehr langen Pinsel am Ende; sie stehen in verschiedener Richtung auf dem Kopf, sind parallel, konvergieren, divergieren, oder kreuzen sich (*Ischnodactylus mirabilis*), sind nach vorn gerichtet, stehen senkrecht oder zeigen nach hinten. Ich glaube nicht, dass irgendwo anders im Tierreich eine derartige Mannichfaltigkeit besteht. Alle Hörner der Diaperiden, wenigstens der Asiaten (bei den Afrikanern macht *Gargilius* eine Ausnahme), stehen auf dem Kopf. Sie entspringen konstant, entweder aus dem Nacken (*Ischnodactylus* und einhörnige *Platydema*) oder stehen zwischen den Augen, wie bei den meisten zweihörnigen Arten, oder auf dem Clypeus (bei *Pentaphyllus biconiger*), oder am Vorderrand des Epistoms (bei den drei- und vierhörnigen Arten).

Ob diese Hornbildung im Kampf der Geschlechter eine Rolle spielen oder ein Schmuck sind, wage ich nicht zu entscheiden. Gegen das erstere sprechen mehrere Bedenken: die haarfeinen Hörner vieler *Ischnodactylus*-Arten, die überdies an der Spitze einen Haarpinsel tragen und wieder fast das Epistom berühren, sind wohl kaum Waffen, auch die starke Asymmetrie bei *Platydema*-Arten ist sicher bei der Anwendung der Hörner im Kampf um das andere Geschlecht störend.

Asymmetrie.—Wie schon oben erwähnt, sind eine Anzahl Arten von *Platydema*, ebenso *Anisocara*, am Kopf des Männchens asymmetrisch gebaut. Diese Bildung ist von hohem Interesse und verdient besondere Erwähnung, denn sie ist ganz konstant, findet sich also bei allen männlichen Individuen der betreffenden Arten, ist nur weniger auffällig wenn die Hornbildung bei den Tieren mangelhaft entwickelt ist. Die Asymmetrie findet sich bei vielen der gefleckten Arten von *Platydema*, ferner bei *haemorrhoidalis*. Es ist nun konstant bei einigen Arten das linke Horn stark entwickelt, das rechte verkümmert, bei anderen das rechte normal, das linke reduziert. Uebrigens haben auch *Platydema* anderer Faunengebiete eine ähnliche Erscheinung: so *P. aries* aus Australien und *P. tricornutus* aus Madagaskar. Nun kommen, wenn auch nur vereinzelt, asymmetrische Bildungen auch bei andern Insekten vor. Fast immer aber sind es die Mandibeln, welche Ungleichheit zeigen, zum Beispiel bei *Hister inaequalis*, bei der Carabidengattung *Anthia*, ferner bei mehreren Wespen, Ameisen, und Termiten. Recht auffällig sind einige Brenthiden-Gattungen in dieser Beziehung. Hier aber sind es die Hörner auf dem Kopf des Männchens die ungleich sind. Ich kenne kein Gegenstück zu dieser Erscheinung. Bei gewissen Crustaceen sind es die Vorderbeine bei welchen sich die Asymmetrie ausprägt.

ZEICHNUNG

Im Gegensatz zu den Boletophaginen, die sich durch ein auffällig rauhes Hautskelett auszeichnen, sind die Diaperinen ganz glatt, nur einzelne leicht behaart. Ausserdem sind nicht wenige Arten unserer Unterfamilie gezeichnet, dagegen nicht eine Art der Boletophaginen. Gezeichnet oder gefleckt sind viele *Platydema*-Arten, alle Arten von *Diaperis* und *Basanus*, die meisten *Ischnodactylus*-Arten, ferner *Spiloscapha*, einzelne *Pentaphyllus*- und *Ceropria*-Arten. Die Zeichnung besteht fast immer in gelblichen oder roten Flecken und Binden auf dunklem, nicht metallischem Grunde. Bei den meisten Arten von *Ceropia* sind auf

metallischer Oberseite prachtvoll irisierende Flecken vorhanden und zwar meist ein Schulter- und ein Spitzensleck.

Man ist im allgemeinen, und zwar mit Recht, geneigt die Zeichnung oder Fleckenbildung bei Käfern als ein Merkmal von geringem specifischen Wert anzusehen, denn sie sind selten beständig. Ich erinnere nur an die Zeichnung der Cicindelen, Coccinelliden, gewisser Chrysomeliden, Erotyliden, und Zonabris-Arten. Natürlich ist eine gewisse Gesetzmässigkeit in dem Schwinden und Zunehmen der Zeichnung vorhanden; auch die Anordnung ist fast immer an bestimmte Regeln gebunden, die für die einzelnen Arten leicht festzulegen sind. Bei den meisten Tenebrioniden dagegen ist die Zeichnung recht beständig, und das trifft besonders für die indo-malayischen Diaperinen zu (manche amerikanische Arten dagegen sind ungemein variabel). Natürlich kommen auch hier geringe Schwankungen vor, die sich besonders in der Grösse der Flecken und Binden zeigen. Im übrigen aber kommt bei unseren Käfern der Färbung ein ziemlich hoher systematischer Wert zu. Das geht besonders daraus hervor, dass die Färbung die Skulptur beeinflusst, und das geschieht in doppelter Weise:

a. In seltenen Fällen (einige *Basanus*-Arten) sind die Decken nicht vollkommen flach, sondern auf den Flecken leicht schwielig erhaben. Eine ähnliche Erscheinung finden wir bei manchen Erotyliden.

b. Häufiger, besonders bei fast allen *Ischnodactylus*-Arten, aber auch bei einzelne *Platydema*, sind die Hauptzwischenräume 3, 5, zuweilen auch 7, auf den Flecken, besonders der vorderen Binde, auf Kosten der anderen Interstitien (2, 4, 6) verbreitert. Die genannten Streifen sind wie bekannt entstehungs-geschichtlich auf die Hauptadern der häutigen Vorderflügel anderer Insekten zurückzuführen.¹ Wäre nicht eben diese Verbreiterung auf den Querbinden vorhanden, so würde von Hauptrippen bei *Ischnodactylus* und *Platydema* nicht die Rede sein können, denn im übrigen sind die Zwischenräume nicht abwechselnd breiter oder erhabener.

c. Bei Arten mit stark gezackten Querbinden (sehr auffällig zum Beispiel bei der afrikanischen Diaperiden-Gattung *Gargilius*, aber auch bei *Ischnodactylus* mit Binden oder mit sehr kleinen Flecken), schwach und wenig deutlich bei den gezeichneten *Platydema*, wird der Vorrang, den die Hauptrippen gegenüber den andern haben, dadurch festgelegt dass die Zacken sich

¹ Kolbe, H. J., Einführung in die Kenntnis der Insekten, 257 ff.

gerade in ihnen befinden, und auf ihnen nach vorn oder hinten gehen.

Bestimmungstabelle für die asiatischen Diaperinen-Gattungen.

1. Fühler 11-gliedrig, Tarsen unten einfach behaart, Augen meist gross, Oberlippe vom Epistom meist durch eine deutliche Gelenkhaut getrennt 2.
- Fühler 10-gliedrig, Tarsen zottig behaart und in der Behaarung unten mit Dörnchen, Augen winzig klein, zwischen Oberlippe und Epistom keine Gelenkhaut *Menimus* Sharp.
2. Gelenkhöhlen der Vorderhüften hinten offen, das erste Fühlerglied in beiden Geschlechtern stark verlängert, beim Männchen einen riesigen Haken bildend, Augen sehr klein, Flügeldecken verworren punktiert *Labidocera* g. nov.
- Gelenkhöhlen der Vorderhüften geschlossen, das erste Fühlerglied klein, normal, Augen gross oder sehr gross, Flügeldecken (Ausnahmen *Pentaphyllus* und einige *Basanus*-Arten) mit reihiger Punktierung 3.
3. Die Wangen engen die Augen kaum ein, diese kugelrund, Mittelbrust bis zur Hinterbrust eingedrückt und vertieft, Flügeldecken verworren punktiert (bei *strictus* gefurcht) *Pentaphyllus* Latreille.
- Die Wangen schnüren die Augen tief ein, Mittelbrust vorn ausgeschnitten oder eingedrückt, aber hinten mit der Hinterbrust in gleicher Ebene liegend. Flügeldecken gereiht punktiert oder gestreift, oder doch (bei *Basanus*) mit Spuren von Punktreihen 4.
4. Das erste Glied der Hintertarsen ist kaum länger als das zweite, das Prosternum ist sehr kurz und vorn senkrecht abgeschnitten und fällt ohne Rand bis zur Vorderkante ab, Endglied der Maxillarpalpen zylindrisch. Körper fast kugelig gewölbt, jede Decke vorn mit kleiner stumpfer Schwiele *Diaperis* Linnæus.
- Das erste Glied der Hintertarsen ist viel länger, das Prosternum fällt nicht hoch senkrecht bis zur Vorderkante ab, Endglied der Taster meist dreieckig oder etwas beilförmig, Körper flacher, oval oder fast zylindrisch, Decken im dritten oder vierten Zwischenraum ohne Schwiele 5.
5. Flügeldecken an der Spitze aussen lang ausgeschnitten, Fühler dick, schnur förmig, die Glieder schlecht abgesetzt, Prosternum wagerecht, aber hinten flach, ohne senkrechten Absturz, unten am Fortsatz ausgehöhlt, Mittelbrust vorn nicht eingedrückt, Schienen ohne krenulierte Kante *Basanus* Lacordaire.
- Flügeldecken an der Spitze ohne Ausschnitt, Fühler gut gegliedert, Prosternum hinten mit starkem, meist senkrechtem Absturz, Mesosternum stark eingedrückt oder augeschnitten, Schienen meist mit feiner, krenulierter Aussenkante 6.

* Von dieser Gattung dürfte *Enanea* Lewis, die beim Männchen zahnförmig aufgebogene Ecken des Epistoms und 4-gliedrige Fühlerkeule hat, kaum generisch verschieden sein.

6. Vordertarsen des Männchens erweitert, Vorder- respektiv Mittelschienen, meist beide, in diesem Geschlecht leicht geknickt, Körper fast immer mit irisierenden Metallfarben, grosse Arten umfassend.
- Ceropria* Castelnau and Brulle.
- Vordertarsen des Männchens nicht erweitert, Vorder- und Mittelschienen nicht geknickt, Körper selten (bei einige *Platydema*), und nie irisierend metallisch, kleine und mittelgrosse Arten umfassend 7.
7. Die Schienen aussen stielrund, glatt, ohne fein krenulierten Kiel, Prosternum breit, hinten halbkreisförmig, Mittelbrust bogenförmig eingedrückt, Abdominalfortsatz sehr breit oder abgestutzt 8.
- Schienen aussen mit fein krenuliertem Kiel, Prosternum hinten schmal, spitz, Mesosternum V-förmig oder dreieckig ausgeschnitten, Abdominalfortsatz schmal und mehr oder minder dreieckig 9.
8. Oberseite rot- oder schwarzgelb gefleckt, Seiten des Halsschildes gerundet, Fühler vom vierten Gliede an erweitert *Spiloscpaha* Bates.
- Oberseite metallisch, doch ausserdem oft hell gefleckt, Seiten des Halsschildes trapezisch verengt, Fühler nicht vom vierten Gliede an erweitert *Scaphidema* Redtenbach.
9. Körper zylindrisch, Endglied der Maxillarpalpen fast zylindrisch, Halsbasis fein aufgebogen *Hoplocephala* Castelnau and Brulle.
- Körper oval (nur bei *Platydema orientalis* zylindrisch), Endglied der Maxillarpalpen dreieckig, Halsschildbasis unverändert 10.
10. Epistom des Männchens dreieckig vorgezogen, oder stark aufgebogen, drittes Fühlerglied viel länger als das vierte 11.
- Epistom einfach, drittes Fühlerglied selten länger als das vierte 12.
11. Körper sehr flach, Oberseite gezeichnet, Männchen meist mit zwei gleichen, haarfeinen, langen Hörnern im Nacken, die nach vorn gerichtet sind *Ischnodactylus* Chevrolat.
- Körper stark gewölbt, einfarbig, etwas metallisch, Männchen mit zwei ungleichen, nach hinten gerichteten Hörnern neben den Augen.

Anisocara g. nov.

12. Zwischen Oberlippe und Epistom fehlt eine Gelenkhaut, Körper lang, parallelseitig (*Tenebrio*-ähnlich), Endglied der Maxillarpalpen zylindrisch *Martianus* Fairmaire.
- Kopf mit deutlicher Gelenkhaut zwischen Oberlippe und Epistom, Körper mehr oder minder oval, sehr selten kurz zylindrisch, Endglied der Maxillarpalpen dreieckig 13.
13. Männchen mit Porengrube auf dem Mentum, drittes Fühlerglied länger als das vierte, die folgenden selten quer, Prosternum hinten schneidig scharf und blattdünn, Körper meist auffallend flach.

Ischnodactylus Chevrolat.

Männchen ohne Porengrube auf dem Kinn, nie mit haarförmigen aus dem Nacken entspringenden Hörnern, drittes Fühlerglied so lang wie das vierte, von diesem oder dem fünften an meist stark quer. Prosternum hinten spitz, aber nicht blattdünn.

Platydema Castelnau and Brulle.

* Dieses Merkmal trifft nicht für alle Arten von *Hoplocephala* im jetzigen Sinne zu, wohl aber für alle asiatischen.

Genus BASANUS Lacordaire

Basanus LACORDAIRE, Genera Col. 5 (1859) 306, nota; CHEVROLAT, Compt. Rend. Soc. Ent. Belg. 21 (1878) 151.

Die Beschreibung der Gattung bei Chevrolat ist nicht schlecht, nur die der Art *forticornis* Dejean ist ganz ungenügend. Die wichtigsten Kriterien sind die sehr dicken behaarten Fühler, die am Ende aussen ausgeschnittenen Flügeldecken (daher stark verkürzten Epipleuren), das vollkommene wagerechte, hinten breite Prosternum das auf seiner Unterseite ausgehöhlt ist und dem Mesosternum vorn aufliegt.

Bei dieser Gattung kann eine brauchbare Bestimmungstabelle auf die Färbung der Decken gegründet werden, die recht konstant ist. Plastische Merkmale sind viel seltener.

1. Die ganze Oberseite hell gefärbt, Flügeldecken mit starken Punktreihen. (Philippinen.) *B. misellus* sp. nov.
- Oberseite mehrfarbig oder schwarz mit Zeichnungen: Flügeldecken selten mit deutlichen Punktreihen. 2.
2. Decken blaugrün, mit grossem, runden Fleck vorn: Seitenrand der Decken nur an der Schulter sichtbar, mit äusserst feinen Wimperhaaren versehen. (Philippinen.) *B. hellus* sp. nov.
- Decken schwarz mit Querbinde vorn, oder dort ohne Zeichnung; Seitenrand von oben ganz sichtbar, unbewimpert. 3.
3. Nur die Flügeldecken schwarz, der übrige Körper gelb; Zeichnungen auf den Decken fehlen, nur die Spitze rotgelb. (Celebes.)
..... *B. celebensis* sp. nov.
- Die ganze Oberseite schwarz, nur bei *pictus* haben Kopf und Halsschild dunkelrote Flecke; Decken mit Zeichnungen. 4.
4. Halsschild mit roten Flecken, Spitzenfleck der Decken lang und verästelt, Schenkel mit roten Ring, grosse Art. (Borneo und Sumatra.)
..... *B. pictus* sp. nov.
- Halsschild ganz schwarz, Spitzenfleck rund oder quer, Schenkel schwarz 5.
5. Der Spitzenfleck ist sehr gross, von ein Drittel der Deckenlänge, und lässt nur den Nahtstreif schwarz. (Java.) *B. apicalis* sp. nov.
- Der Spitzenfleck ist sehr klein, rundlich. 6.
6. Das Abdomen ist rot oder rotgelb, Fühlerglieder quadratisch, Schläfen schwach eingeschnürt 7.
- Das Abdomen ist schwarz, Fühlerglieder quer, Schläfen stark eingeschnürt 8.
7. Die Vordere Binde ist viel breiter als der Raum vor ihr, Decken lackglänzend mit kräftigen Punktlinien, Halsschild äusserst fein punktiert. (Philippinen.) *B. philippinensis* sp. nov.
- Die vordere Binde ist viel schmäler, stark gezackt, der schwarze Raum vor ihr breiter als sie. Halsschild sehr deutlich punktiert, die Punkte der Linien kaum grösser als die der Zwischenräume. (Japan.)
..... *B. erotyloides* Lewis.

8. Die vordere Binde ist stark gezackt, besonders am Vorderrand..... 9.
 Die vordere Binde ist sehr breit, mit geradem Hinterrand, vorn nach innen nur einfach erweitert. (Sumatra)..... *B. sumatrensis* sp. nov.
9. Die vordere Binde sendet in der Mitte einen langen Ausläufer nach vorn, dort ist oft ein Basalfleck vorhanden, die Punktreihen der Decken sind in der Mitte sehr deutlich. (Sumatra und Malacca.)
B. longior sp. nov.
 Die vordere Binde ist vorn nur leicht ausgezogen. Decken nur mit Spuren von Punktreihen. (Java)..... *B. javanus* Chevrolat.

Basanus javanus Chevrolat. Tafel 1, Fig. 1, 2.

Basanus javanus CHEVROLAT, Compt. Rend. Soc. Ent. Belg. 21 (1878)
 151.

Mit dieser Art fällt *B. forticornis* Dejean, in litt., zusammen, eine Art die nie beschrieben wurde, sondern nur in den Sammlungen eine gewisse Tradition für sich hatte.

Sehr lang oval, tief schwarz, glänzend, Zeichnung der Decken gelbrot, die beiden ersten Fühlerglieder, Mundteile, und Tarsen meist braun oder gelbbraun.

Der Kopf samt den Augen ist ganz flach, nur auf den Wangen zeigt sich eine sehr flache Mulde, Augenfalten und Augenfurchen fehlen, die Augen quellen stark kugelig vor, sie werden vorn vor den Wangen nur schwach eingeengt, ihr oberer Teil ist kreisrund. Die Wangen sind viel schmäler als die Augen, sie verengen sich bogig nach vorn, ohne ein Epistom abzusetzen. Die Clypeusecken sind verrundet, der mittlere Teil ist vollkommen flach und geht in die Gelenkhaut über. Die Punktierung ist sehr dicht und kräftig, gleichmäßig. Die Fühler sind dick, Glied 3 ist kaum so lang wie 4, schwach konisch, 4 und alle folgenden sind quer rechteckig, kurz beborstet, mit grossen Sinnesporen versehen. Das letzte Glied ist oval. Das Kinn ist stark quer trapezisch, ganz flach, ohne Geschlechtsauszeichnung.

Der Halsschild ist etwa 1.5 mal so breit wie in der Mittellinie lang, sehr flach gewölbt, wesentlich schmäler als die Decken, in der Endhälfte parallel, dann nach vorn nicht sehr stark verengt. Die Vorderwinkel ragen deutlich verrundet vor, die Seitenrandkehle ist tief, gleichbreit, und stösst winklig an die Flügeldecken. An der Basis finden sich zwei etwas dreieckige, kräftige Grübchen. Die Punktierung ist wie die des Kopfes sehr deutlich, gleichmäßig, der Vorderrand ist undeutlich gerandet. Das Schildchen ist spiegelblank, dunkelbraun.

Die Flügeldecken haben eine gezackte, gelbliche Querbinde im ersten Drittel, welche die Naht breit freilässt und bis zur Sei-

tenrandkehle geht, ihr Hinterrand ist dreizackig, der vordere hat zwei Spitzen, von denen die innere in der Mitte der Decken mehr oder weniger weit nach vorn geht. Der Seitenrand der Decken ist von oben der ganzen Länge nach sichtbar. Der Spaltenfleck ist mässig gross, lässt die Naht breit frei, und stösst hinten an den Ausschnitt der Decken. Die Skulptur ist variabel; es sind normalerweise sehr feine Reihen runder, mässig tiefer Punkte vorhanden, die vollkommen flachen Zwischenräume sind ebenso grob punktiert. Sehr oft verschwimmen die Punkte der Streifen und Zwischenräume ineinander, so dass Reihen nicht mehr erkennbar sind.

Die Unterseite ist bei Ansicht von der Seite sehr fein absteigend behaart. Das Prosternum ist vollkommen wagerecht, am Ende breit verrundet, dünn, unten tief ausgehölt, die Mittelbrust leicht eingedrückt und vorn im Eindruck mit einer sehr grossen Schwiele auf welche die Aushöhlung des Prosternums passt. Das Abdomen ist fein punktiert, das Analsegment jederseits mit kräftigem Grübchen. Die Beine sind schlank, die Schenkel dünn, die Schienen fast linear. An den Hintertarsen ist Glied 1 so lang wie der Rest.

Länge, 9 bis 10 Millimeter; Breite, 4 bis 4.4.

Java, Malang; Preanger (*Sijthoff*); Mont Gede, 4,000 Fuss, August, 1892 (*Fruhstorfer*); Pengalengan, 4,000 Fuss (*Fruhstorfer*); Palabuan (*Fruhstorfer*); Preanger, Pelobo cas (*Corporaal*). Südost Borneo (*Grabowsky*).

Siebzehn Exemplare in den Sammlungen Berlin, Dahlem, Leyden, München, und Gebien.

Basanus longior sp. nov. Tafel 1, Fig. 3.

Mit der vorigen Art nahe verwandt, scheint aber nur auf Sumatra und Malacca vorzukommen. Sie ist nicht unwe sentlich grösser und schmäler als *javanus*, ähnlich gefärbt, aber die vordere Binde ist viel schmäler, mehr gezackt, und sendet vorn einen langen Ausläufer aus, oft findet sich ein basaler Längsfleck, innen von der Schulter. Der Halsschild ist schmäler, die Punktreihen der Decken sind sehr deutlich, die Punkte der Streifen stehen viel dichter als die der Zwischenräume. Die gelben Flecken und Binden sind meist deutlich erhaben.

Länge, 10 bis 11.3 Millimeter; Breite, 4.1 bis 4.6.

Sieben Exemplare in den Sammlungen Berlin, Dahlem, Leyden, München, Stettin, und Gebien.

Sumatra, Deli, Ober Langkat (*W. Reineck*); Soekaranda, Januar, 1894 (*Dohrn*); Tandjong Morawa, Serdang (*Hagen*);

Pajakombo (*H. Ronyer*). Malacca, ohne genauere Angaben, im Museum München.

Basanus philippensis sp. nov.

Vorliegende Art steht ebenfalls dem *B. javanus* sehr nahe, so dass eine ausführliche Beschreibung überflüssig ist.

Die Oberseite ist noch glänzender, die ganze Unterseite ist gelbrot bis auf die etwas dunkleren Pleuren, die vordere Binde ist viel breiter als der Raum vor ihr an der Basis, und die Punkte der Reihen sind scharf von den sparsamen Punkten der Zwischenräume getrennt, die Fühlerglieder sind wie bei *javanus* quer.

Länge, 7.8 bis 8.8 Millimeter.

Zwei Exemplare im Museum Stettin von den Philippinen (*Semper*), von denen mir eines für meine Sammlung überlassen wurde. Ferner aus dem Museum Dresden von Luzon, Mount Maquiling, und Malinao, Tayabas (*Baker*).

Basanus erotyloides Lewis.

Basanus erotyloides LEWIS, Ent. Mo. Mag. II 2 (1891) 71; Ann. & Mag. Nat. Hist. VI 12 (1894) 396, t. 13, f. 7.

Diese Art aus Japan liegt mir nur in zwei Stücken vor (Sammelungen Berlin und Gebien). Sie gleicht dem *javanus* in Gestalt und Färbung vollkommen und unterscheidet sich nur durch den rauheren Kopf, die nicht queren Fühlerglieder (diese sind quadratisch), die feiner punktierten Zwischenräume, deren Punkte feiner sind als die der Reihen, und durch das rote Abdomen. Die Augen quellen lange nicht so stark vor; demgemäß sind die Schläfen nur schwach eingeschnürt.

Japan.

Basanus erotyloides Lewis var. annamitus var. nov.

Bei dieser Aberration des Festlandes ist die ganze Unterseite rot.

Zwei Exemplare von Annam, Phuc Son (*Fruhstorfer*) im Museum Dresden, das mir ein Stück für meine Sammlung überliess.

Basanus sumatranaus sp. nov. Tafel 1, Fig. 4.

Ebenfalls mit *javanus* nahe verwandt und in allen Skulpturmerkmalen mit ihm übereinstimmend. Oben und unten schwarz, Zeichnung der Decken gelbrot, Mundteile und Füsse braun. Der Kopf ist flach, nur die Wangen sind leicht eingedrückt, sie sind ganz verrundet, das Epistom ist sehr seicht ausgeschnitten,

die Stirn ist ungefähr 1.5 mal so breit wie eines der stark vorquellenden Augen. Die Punktierung ist sehr fein und dicht, hinten etwas sperriger, nicht rauh. Die Fühler sind wie gewöhnlich dick und stark, Glied 3 ist konisch, länger als 4; alle folgenden sind quer, flach, 1.5 mal so breit wie lang, 4 ist etwas schief, das heist, oben länger als unten, 11 ist flach, lang oval. Das Kinn ist stark quer trapezisch, flach, mit geraden Seiten, hart neben diesen läuft eine feine, scharfe Längsfurche.

Der Halsschild ist an der Basis fast 1.5 mal so breit wie lang, in der Endhälfte fast parallel, die Seitenrandkehle ist gleich breit und kräftig. Der basale Mittellappen ist kräftig abgesetzt. Die Punktierung ist sehr fein und dicht, aber nicht gedrängt, die basalen Grübchen sind rundlich, flach.

Die Flügeldecken sind von der Form wie bei *javanus*, aber anders gezeichnet. Die vordere Binde ist sehr breit, fast etwas breiter als der schwarze Raum vor ihr, ihr Hinterrand ist gerade, der Vorderrand ist nicht gezackt, sondern nur innen erweitert. Der Nahtstreif und die Seitenrandkehle sind schwarz. Der Spitzfleck ist wie bei *javanus* gebildet. Der ganze Basalteil der Decken ist sehr breit regellos punktiert, erst von kurz vor der Mitte an prägen sich feine Punktlinien aus, deren Punkte gröber sind als die der Zwischenräume, an der Spitze ist der Nahtstreifen furchig vertieft.

Die Unterseite ist ganz schwarz, das Prosternum ist hinten flach, der Fortsatz ganz wagerecht, hinten fast halbkreisförmig abgerundet, die Furche, welche vor den Hüften den Mittelteil des Prosternums von den Pleuren scheidet, ist stark S-förmig geschwungen, tief eingedrückt. Die Beine zeigen keine Artmerkmale.

Länge, 8 Millimeter; Breite, 3.75.

Ein Weibchen von Sumatra, Solok; in meiner Sammlung.

Die ganz andere Zeichnung der Decken scheidet diese Art leicht von *javanus* und den Verwandten.

Basanus apicalis sp. nov. Tafel 1, Fig. 5.

Von der Gestalt des *B. javanus*, aber etwas breiter, glänzend schwarz, Flügeldecken mit gelbroten Binden und Flecken, die viel breiter sind als bei irgend einer andern Art.

Der Kopf ist flach, die Augen quellen seitlich stark vor; die Schläfen schnüren daher den Hinterkopf stark ein und liegen dem Hinterrand der Augen dünn an. Die Stirn ist 1.5 mal so breit wie ein Auge, die Punktierung ist ausserordentlich fein

und sehr eng. Die Wangen sind kaum aufgebogen, sondern ebenfalls fast flach; die Vorderecken des Epistoms sind breit verrundet. Die Fühler sind sehr dick, die Glieder vom vierten an stark quer, die mittleren und vorletzten 1.5 mal so breit wie lang, das letzte ist so breit wie lang, am Ende ganz rund. Das Kinn ist genau trapezisch, flach, der Vorderrand etwas breiter als die Mittellinie lang, jederseits findet sich eine gerade, feine, schräge Furche.

Der Halsschild ist ähnlich wie bei *javanus*, aber breiter, an der Basis fast doppelt so breit wie die Mittellinie lang, die Vorderecken treten wenig vor. Die Basalgrübchen sind stark, der Ausschnitt an der Basis jederseits des Mittelstücks ist gut entwickelt, die Punktierung ist fein aber sehr deutlich, ziemlich eng, nirgend gedrängt.

Die Punktreihen der Flügeldecken sind nur in der Mitte deutlich, aber sehr fein, ihre Punkte ebenso grob wie die der Zwischenräume, die ziemlich eng punktiert sind, vorn und hinten erlöschen die Streifen und die Punktierung ist feiner. Die vordere Binde ist so breit wie der schwarze Raum vor ihr, sie ist vorn und hinten in der inneren Hälfte 3-zackig und lässt die Naht breit frei. Der hintere Fleck ist auffallend gross, so lang wie der schwarze Raum vor ihm, er lässt nur den Nahtstreif und den aufgebogenen Rand schwarz.

Die Unterseite ist ganz schwarz, die Furche des Prosternums vorn jederseits der Mitte ist im vorderen Teil nicht scharf ausgeprägt, sondern mehr ein Eindruck, der Fortsatz ist jederseits gekantet, der Abfall seitlich senkrecht.

Länge, 10 Millimeter; Breite, 4.3.

Zwei Exemplare aus der Sammlung Veth, davon jetzt eines in meiner eigenen, von Java, ohne genauere Angabe.

Von allen Arten durch die breite, innen dreizackige Vorderbinde und den auffällig grossen Spitzenfleck leicht zu unterscheiden.

Basanus pictus sp. nov. Tafel 1, Fig. 6.

Sehr gross, lang gestreckt, querüber stark gewölbt, mit bunter, rotgelber oder roter Zeichnung auf den Decken, roten Flecken auf dem Pronotum, in der Mitte rötlichen Kopf, roter Schenkelmittle und ebenso gefärbten Rändern des Abdomens.

Kopf flach eingedrückt, die Seiten des Vorderkopfes sind ziemlich stark aufgebogen, wodurch der mittlere Teil flach muldig vertieft erscheint. Die Punktierung ist sehr dicht, kräftig, fast

Basanus celebensis sp. nov.

Von der Gestalt der flachen *Platydema*-Arten, aber etwas länglicher. Der ganze Körper ist gelbrot, nur die Flügeldecken bis auf die gelbrote Spitze und die letzten acht Fühlerglieder sind schwarz.

Der Kopf ist ganz flach, die Wangen sind nicht aufgebogen, auch am Vorderkopf nicht. Die Punktierung ist ausserordentlich fein, nicht sehr eng, ungleichmässig. Die Augen sind klein und quellen nicht sehr stark vor, ihr Hinterrand ist also nicht senkrecht auf den Hals gesetzt, wie bei *apicalis* zum Beispiel, oder *javanus*; die Stirn ist ungefähr viermal so breit wie ein Auge von oben gesehen. Die Fühler sind wie gewöhnlich stark entwickelt, nur die ersten drei Glieder sind gelb, das Ende des elften Gliedes ist braun, Glied 3 ist kaum 1.5 mal so lang wie dick, schwach konisch. Vom vierten an sind alle Glieder kräftig quer, die vorletzten noch stärker, das letzte ist doppelt so lang wie das vorletzte, lang oval, an der Spitze nicht abgestutzt. Das Kinn ist breiter als lang, genau trapezisch, flach, mit sehr feiner Randfurche, jederseits der Mitte findet sich ein feiner Porenpunkt.

Der Halsschild ist an der Basis fast doppelt so breit wie in der Mittellinie lang, die Seiten sind von den Hinterecken an nach vorn verengt. Der basale Mittellappen ist nicht sehr stark entwickelt, die basalen Grübchen sind sehr flach und ganz undeutlich. Die Punktierung ist ausserordentlich fein und wenig dicht. Die Spitzenrandung ist vollständig, die Seitenrandkehle breit und kräftig aufgebogen. Das Schildchen ist rot.

Die Flügeldecken sind auch in der Mitte nicht parallel, flach, schwarz, glänzend, der ganze Spitzenteil der Decken ist gelbrot, es sind also nicht wie bei andern Arten abgegrenzte Spitzflecke vorhanden. Die Punktlinien sind meistens ausgeprägt und zwar im mittleren Teil ihres Verlaufs; sie sind ausserordentlich fein, wenig stärker als die Zwischenräume punktiert, bei einigen Exemplaren sind aber Linien nicht mehr erkennbar. Der Nahtstreif ist leicht furchig vertieft.

Die ganze Unterseite ist gelb oder gelbrot, nackt, die Prosternalnähte vorn jederseits der Mitte sind vollständig, sehr stark S-förmig gekrümmt, das Prosternum ist ganz wagerecht, hinten breit, der Seitenabfall des Fortsatzes ist schräge, er ist also nicht gekantet. Der Eindruck des Mesosternums geht bis an den Rand des Metasternums.

Länge, 6.1 bis 7 Millimeter; Breite, 3 bis 3.6.

In den Sammlungen Berlin, Dahlem, Dresden, Leyden, und Ge-
bien, 11 Exemplare, sämtlich aus derselben Quelle.

Süd-Celebes, Lampa-Battan, 3,000 Fuss, März, 1896 (Fruh-
storfer).

Diese Art ist viel breiter als die andern und von ihnen durch
ungefleckte Flügeldecken (nur die Spitze ist breit hell gefärbt),
den übrigen gelben Körper, und das nicht gekantete Prosternum
weit verschieden.

Basanus hellus sp. nov. Tafel 1, Fig. 7.

Viel gewölbter und ovaler als die typischen Arten der Gattung,
von der Gestalt eines gestreckten *Scaphidema metallicum*. Unterseite,
Kopf, und Halsschild rotgelb, dieser mit starkem, bläu-
lichen Schein, Beine heller, fast gelb, ein verwaschener Spitzen-
fleck ebenfalls rot, ein grosser Fleck vorn auf den Decken gelb,
diese selbst blaugrün.

Der Kopf ist ganz flach, nur auf dem Epistom findet sich vorn
jederseits ein sehr flacher Eindruck. Die Wangen verengen sich
sehr schnell und fast geradlinig nach vorn, die Ecken vorn sind
breit verrundet, die Punktierung ist nicht eng, fein, aber un-
gleich stark. Die Stirn ist über doppelt so breit wie eines der
stark queren, seitlich kräftig vorquellenden Augen. Die Schlä-
fen sind stark eingezogen, aber die Einschnürung ist am Hals
nicht eckig. Die Fühler reichen bis zur Basis des Halsschildes,
sie sind ausserordentlich dick, alle sehr gedrungen aufeinander
sitzenden Glieder sind stark quer, nur das letzte ist lang oval.
Das Kinn ist quer trapezisch, in der Mitte leicht gewölbt, ohne
deutliche Furche jederseits.

Der Halsschild ist an der Basis doppelt so breit wie in der
Mittellinie lang, die Spitze ist nur sehr seicht ausgebuchtet, die
breit verrundeten Vorderecken treten schwach vor, die Randung
dort ist scharf und vollständig. Die Seiten sind in der Basal-
hälfte parallel, dann gerundet nach vorn verengt, die basalen
Grübchen sind sehr seicht, die Punktierung ist ausserordentlich
fein und nicht dicht.

Die Flügeldecken sind so stark gewölbt dass der Seitenrand
nur hinter der Schulter sichtbar ist, sie sind glänzend blaugrün,
die Punktlinien sind wie gewöhnlich nur in der Mitte ausge-
prägt, nur die erste ist der ganzen Länge nach entwickelt und
leicht furchig vertieft, besonders an der Spitze, die äusseren
Linien sind erloschen. Die Punktierung der Zwischenräume ist
sehr sparsam und nur bei sehr starker Vergrösserung sichtbar.

Der vordere Fleck ist breiter als der Raum vor ihm, er ist fast kreisrund, mit gerader Basis und nur nach der Seite hin etwas ausgezogen, er lässt den Rand breit freit und ebenso die beiden innern Zwischenräume. Die Spitze ist dunkelrot, nicht mit scharf begrenztem Fleck versehen. Die ganze Oberfläche der Decken ist sehr sparsam, unauffällig, kurz gelb beborstet. Die äusserste Randkante hat einen Saum sehr kurzer, abstehender Wimperbörstchen.

Die Unterseite ist kahl, die Prosternalnähte sind vorn nicht eingeschnitten, sondern nur eingedrückt. Der Fortsatz ist flach, jederseit undeutlich gerandet, am Ende breit. Die Beine sind kurz und dick. Die vorderen Schienen sind viel kürzer als bei andern Arten und zur Spitze viel breiter. An den dünnen Hintertarsen ist Glied 1 so lang wie 3 + 4.

Länge, 4.2 Millimeter; Breite, 2.

Ein Exemplar von den Philippinen, Mount Banahao (*Baker*). Diese kleinste Art der Gattung bildet in ihr einen etwas fremden Bestandteil. Sie weicht nicht nur durch die Zeichnung sondern besonders durch blaugrüne Decken ab, die so stark gewölbt sind dass der Seitenrand zum grössten Teil verdeckt ist, im Gegensatz zu allen andern Arten, deren flache Decken den Seitenrand breit frei lassen. Ein wichtiges Merkmal ist auch die Behaarung der Decken und der zarte Wimpersaum; beide sind aber so fein dass sie nur bei guter Vergrösserung sichtbar sind.

Basanus misellus sp. nov.

Klein, flach, einfarbig gelblich braun, nur die mittleren Fühlerglieder schwarz.

Der Kopf ist quer, flach, äusserst fein punktiert, und vorn querüber leicht eingedrückt; die Wangen haben kein deutliches Grübchen. Die Augen quellen stark vor, bis zu ihrem Hinterrand sitzt der Kopf im Pronotum. Die Fühler sind mässig dick; die ersten drei Glieder (das dritte in der Basalhälfte) und die Spitze des letzten Gliedes sind hell gefärbt, die andern schwarz; vom vierten an sind die Glieder quer, das letzte ist 1.5 mal so lang wie breit.

Der Halsschild ist fast doppelt so breit wie in der Mittellinie lang, die Basalhälfte ist fast parallel, nach vorn nur wenig verengt, die Hinterecken sind etwas schräg abgeschnitten, wodurch die Mitte der Basis stark nach hinten gezogen erscheint. Die Seitenrandung ist sehr breit und tief, die basalen Grübchen sind gut ausgeprägt. Die Querwölbung des Pronotums ist

besonders vorn ziemlich stark; die Spitzenrandung ist sehr fein und vollständig, die Vorderecken ragen nicht vor. Die Punktierung ist ausserordentlich fein, ziemlich eng.

Die Flügeldecken haben äusserst feine, aufstehende, kurze, fast weisse Härchen, die nur bei guter Vergrösserung und starker Beleuchtung sichtbar sind; der Rand ist mit sehr feinen Wimperchen versehen. Die Oberfläche hat sieben Reihen gut ausgeprägter, grosser, runder Punkte, die äusseren fehlen. Der Nahtstreif ist hinten vertieft, die anderen verlieren sich dort. Die Zwischenräume sind fast flach und ausser mit sehr feiner Grundpunktierung mit einer unordentlichen, sehr weitläufigen Reihe ziemlich grober Punkte versehen, die so gross wie die der Reihen sind.

Die Unterseite ist nur auf dem Prosternum schwach undeutlich behaart; dieses ist ganz flach, hinten breit, und fällt zur Seite nicht scharfkantig ab. Das Abdomen ist unpunktiert und hat auf dem letzten Segment kein Grübchen. Beine dünn, an den Hintertarsen ist Glied 1 gleich 3 + 4.

Länge, 4.5 Millimeter.

Ein Exemplar von den Philippinen, Mindanao, Kolambugan; ferner im Museum Dresden vom Mount Banahao (*Baker*).

Diese kleine Art ist an dem einfärbigen, hellen Körper und den kräftigen Punktreihen der Decken sofort zu erkennen. Am nächsten steht *B. hellus*, ist aber stark gewölbt, hat sehr dicke Fühler und recht bunte Oberseite.

Genus DIAPERIS Linnæus⁷

Diese Gattung enthält nur wenig Arten, hat aber eine ausserordentlich weite Verbreitung. Sie findet sich durch ganz Europa, das gemässigte Asien, China, Japan, beide Indien, Ceylon, und Nordamerika bis Mexiko. Uebrigens ist auch eine Art aus Cayenne beschrieben (*D. coccinea*). Ob diese aber wirklich zur Gattung gehört möchte ich bezweifeln; die Beschreibung bietet keinerlei Anhaltspunkte. Die andern Arten sind mir alle bekannt. Sie sind alle nahe miteinander verwandt und einander sehr ähnlich. Plastische Merkmale sind nicht häufig, finden sich am Prosternum und bei der Kopfbildung. Geschlechtsmerkmale finden sich nur bei *D. maculata* Olivier aus Nordamerika, bei Welcher das Männchen am Epistom zwei spitze Tuberkeln zeigt.

⁷ Ueber die Litteratur siehe Gebien, Col. Cat., pars 28, p. 364.

Bestimmungstabelle für die asiatischen Diaperis-Arten.

1. Die Stirn ist doppelt so breit wie ein Auge, tief und ganz ausgehöhlten, das Epistom mit Tuberkelähnlicher Erhabenheit, der Spitzenfleck ist klein, dreieckig, Prosternum vorn in der Mitte mit Ecke. Grosse Art. (Japan.) *D. nipponensis* Lewis.
Die stirn ist nicht breiter als ein Auge, nicht ausgehöhlten, Epistom einfach gewölbt, Spitzenfleck der Decken nach vorn ausgedehnt und dort verzweigt. Prosternum vorn heruntergebogen. Arten von der Grösse unserer *D. boleti*..... 2.
2. Die vordere schwarze Binde der Decken ist vollständig, Punktierung der Decken so fein oder feiner als bei *boleti*. (Nordchina, Sibirien, und Japan.) *D. lewisi* Bates.
Die vordere Binde ist mehrfach unterbrochen..... 3.
3. Nahtstreif vorn vor der schwarzen Binde schwarz. Punktierung der Decken so fein wie bei *boleti*. (Formosa und Indo-China.)
D. l. var. intersecta Gebien.
Nahtstreif vorn rot oder gelbrot. Punktierung der Decken gröber als bei *boleti* 4.
4. Grundfarbe der Decken korallenrot, hintere schwarze Querbinde sehr schmal meist von der roten Farbe unterbrochen. (Ceylon.)
D. sanguineipennis Bates.
Grundfarbe der Decken gelb, hintere Binde sehr breit und ununterbrochen. (Südchina.) *D. s. var. sinensis* var. nov.

Zu einer Neubeschreibung der Arten liegt umsoweniger Veranlassung vor, als die Beschreibungen bei Lewis und Bates auf alle wesentlichen Merkmale eingehen. Bei der neuen Varietät *sinensis* bin ich wirklich im Zweifel, ob ich sie neben *intersecta* zu *lewisi* stellen soll, oder als eine geographisch weit getrennte Rasse, der grösseren *sanguineipennis*. Ich lasse sie vorläufig bei der letzteren Art.

Diaperis nipponensis Lewis.

Diaperis nipponensis LEWIS, Entomologist 20 (1887) 217.

Japan, Nikko, Mayebara, Junsai, Sapporo.

Diese Art scheint in den Sammlungen sehr selten zu sein. Mir liegt nur ein einziges, vom Autor gesammeltes Stück in seiner Sammlung vor, das ich aus dem Britischen Museum erhielt.

Diaperis lewisi Bates.

Diaperis lewisi BATES, Ent. Mo. Mag. 10 (1873-1874) 14.

Diaperis rubrofasciatus REITTER, Deutsche Ent. Zeitschr. 23 (1879) 226.

Japan, Nagasaki, Kumamoto, Miyanoshita, Tokio. Sibirien.
Korea (var. *intersecta* Gebien, Archiv Natg. 79, 1913 (1914)

Abt. A, Heft 9, 15, 1 Tafel). Formosa, in grosser Zahl von verschiedenen Fundorten. Annam, Phuc Son (*Fruhstorfer*); Tonkin, Montes Mauson (*Fruhstorfer*); Laos; Tenasserim, Mount Mooleyit, 1,000 bis 1,900 Meter, April, 1887 (*L. Fea*); Burma, Carin Cheba, 1,000 bis 1,100 Meter, April bis Dezember, 1888 (*Fea*).

Diaperis sanguineipennis Bates.

Diaperis sanguineipennis BATES, Ent. Mo. Mag. 10 (1873-1874) 17.
Diaperis ceylonica CHEVROLAT, Pet. Nouv. Ent. 2 (1877) 170.

Ceylon (*Nietner*).

Acht Exemplare in den Sammlungen Berlin, Stettin, und Gebien.

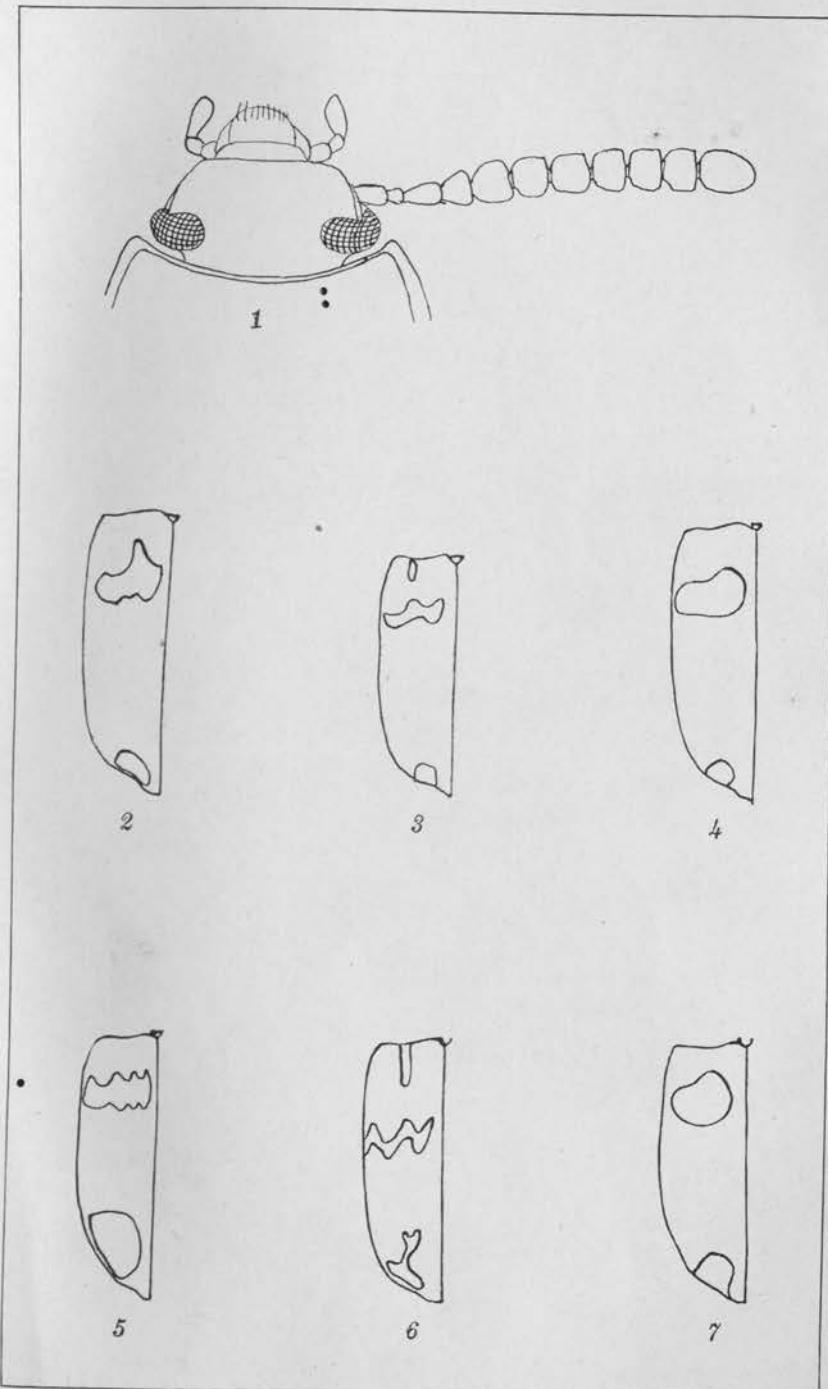
Diaperis sanguineipennis Bates var. *sinensis* var. nov.

China, Hongkong; Canton: Lien-eas, 23ter Juli, 1912 (*Mell*).
In Anzahl in den Sammlungen Gebien und Berlin.

ILLUSTRATION

TAFEL 1

- FIG. 1. *Basanus javanus* Chevrolat. Kopf.
2. *Basanus javanus* Chevrolat. Deckenzeichnung.
3. *Basanus longior* sp. nov. Deckenzeichnung.
4. *Basanus sumatratus* sp. nov. Deckenzeichnung.
5. *Basanus apicalis* sp. nov. Deckenzeichnung.
6. *Basanus pictus* sp. nov. Deckenzeichnung.
7. *Basanus hellus* sp. nov. Deckenzeichnung.



NOMENCLATORIAL NOTES ON THE JASSOIDEA, III

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In this journal¹ I published a second paper on the endemic Philippine genus *Makilingia*, rearranging the species and describing a number of new ones. The paper had been submitted for publication many months prior to its appearance. In the interval some of the material collected by Boettcher in the Philippines drifted into the hands of Dr. L. Melichar, who described and promptly published four supposedly new species of *Makilingia*.² This prior paper did not come to my notice until some months after the appearance of my own paper, when my attention was kindly called to it by Dr. E. Bergroth. The new forms described by Melichar are all common ones from regions long since collected over by us at various times, so that they are all represented in my later paper. Two of them are merely color forms of the protean species described by me under the name *variabilis*, falling within that species as described, although names were not applied to the various color variations represented. The complete synonymy arising from the publication of these two papers is as follows:

Makilingia variabilis Baker is *M. intermedia* Melichar.

Makilingia bakeri Melichar is *M. intermedia* Melichar var. *bakeri* Melichar.

Makilingia suturalis Melichar is *M. intermedia* Melichar var. *suturalis* Melichar.

Makilingia bimaculata Baker is *M. flavifrons* Melichar.

Further changes in jassid names made necessary by conflicts are as follows:

Phlepsius lathropi n. n. for *P. annulatus* Osborn and Lathrop, 1923, not *P. annulatus* Osborn, 1923.

¹ Philip. Journ. Sci. 24 (1924) 57-70.

² Wien. Ent. Zeit. 40 (1923) 17-120.

Phlepsius melichari n. n. for *P. pallidus* Melichar, 1911, not *P. pallidus* Van. D., 1892.

Athysanus³ lindbergi n. n. for *Athysanus fraterculus* Reut., 1887, not *A. fraterculus* Berg, 1879.

Dikraneura marginella n. n. for *D. marginata* De Long, 1924, not *D. marginata* Sahlb., 1871.

Empoasca hartzelli n. n. for *E. vittata* Hartzell, 1923, not *E. (Chlorita) vittata* Lethierry.

³ Possibly the old genus *Athysanus* should be broken up into several more homogeneous groups: *Athysanus* Burm., 1838, type *argentatus* Fabr.; *Euscelis* Br., 1832, type *lineolatus* Br.; and perhaps *Ophiola* Edw. European homopterists should decide on the practicability of this and make known the proper reference of all the palaeartic species. Some of them may be referable to closely allied generic groups proposed by Distant and Matsumura. The same might be said of *Deltoccephalus*, which has become extremely heterogeneous, and has had many proposed generic groups split off from it in other parts of the world, which must now be fully considered in relation to the palaeartic species.